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ABSTRACT

This is the teacher's manual to accompany part 1 of the workbook for grade 5 pupils in the Comprehensive Instructional Management System, a teacher-designed unified mathematics curriculum for kindergarten through grade 7. It is composed of a curriculum, a testing component, and a computer-managed reporting system. The curriculum is organized into modules of similar skills or understandings from 14 topics. Each module has: a suggested period of duration for student mastery; a listing of new skills to be mastered by the student in the form of performance objectives; a section devoted to vocabulary, terms, and symbols; getting-started activities on prerequisite skills in preparation for undertaking new objectives; strategies for teaching the new skills; and student activities for providing reinforcement for the newly learned objective. After the sequence of modules and content by topic are displayed, teaching suggestions for 67 modules on 69 performance objectives are given. The content areas are: numbers and numeration; addition; subtraction; fractions, geometry; measurement; algebraic concepts; graphs, probability, and statistics; and problem solving, plus review. Pages from the student's workbook are interspersed M. (MNS)

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EXPERIMENTAL

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COMPREHENSIVE INSTRUCTIONAL MANAGEMENT SYSTEM

A Cyclical Mathematics Curriculum

PART 1—TEACHER

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See catalogue for price.

FOREWORD

The Comprehensive Instructional Management System (CIMS) is a unified mathematics curriculum for grades K-7. The curriculum is cyclical in design, and reflects the most recent New York City and New York State guidelines.

Utilizing the experience of our system's teachers, we have developed a teacher-designed curriculum that includes a rich selection of classroom-tested successful mathematics activities. The major goal of the CIMS mathematics project is to provide the classroom teacher with a well-structured, objective-based curriculum. All objectives are supported by a variety of strategies. Student mastery of these objectives is readily diagnosed through the system's testing component.

The curriculum format is structured to allow the teacher to determine the ability level of the students in the topic under study, and to permit the students to move forward at their individual rates. Each module of instruction provides the teacher with a set of related performance objectives. These objectives are supported by activities which probe and develop the students' readiness to undertake new skills and concepts. Further reinforcement is given to mastery of the objectives through accompanying student workbooks.

It is hoped that this curriculum will not only assist teachers in developing vital mathematics instruction, but will serve to expand and enrich students' mathematics skills.

Charlotte Frank

Charlotte Frank,
Executive Director
Division of Curriculum and Instruction

ACKNOWLEDGMENTS

The Comprehensive Instructional Management System (CIMS) was developed as a project of the Division of Curriculum and Instruction, Charlotte Frank, Executive Director. Dr. Peter Negroni, Community School Superintendent CSD 12; Dr. Harvey Garner, Community School Superintendent CSD 18; Carlos Edwards, Community School Superintendent CSD 23, and Joseph Pacheco, Community School Superintendent CSD 32 supervised the overall development of the CIMS program within their respective districts.

Morris Freedman, Director of the Office of Curriculum Development and Support; Irwin Kaufman, Director of Mathematics; Kenneth Bates, Director of CIMS; Maria DeSalvio, Assistant Director of Mathematics; Arthur Flug and Doreen Genkin, Assistant Directors of CIMS and Gene Menchini, Program Manager, Distributive Systems, Office of Data Processing Coordination provided overall supervision of this project.

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INTRODUCTION

The Comprehensive Instructional Management System (CIMS) is a teacher-designed educational delivery system composed of a curriculum, a testing component and a computer managed reporting system.

Designed to support mathematics instruction in the classroom, CIMS provides a comprehensive cyclical mathematics curriculum for grades K through 7. Each manual describes the curriculum for a single level or grade. Teacher curriculum developers from elementary, intermediate and senior high schools utilized the most current New York City and New York State guidelines in formulating the curriculum's modules and sequence.

Curriculum Topics

The CIMS mathematics curriculum has been organized into the following 14 topics:

.01 Numbers and Numeration
.02 Addition of Whole Numbers
.03 Subtraction of Whole Numbers
.04 Multiplication of Whole Numbers
.05 Division of Whole numbers
.06 Fractions
.07 Decimals
.08 Integers
.09 Geometry
.10 Measurement
.11 Algebraic Concepts
.12 Graphs, Probability, Statistics
.13 Problem Solving
.14 Review

Modules of Instruction

The CIMS curriculum is organized into modules or groupings of similar skills or understandings. Each module has a suggested period of duration for student mastery, a listing of new skills to be mastered by the student in the form of performance objectives, a section devoted to vocabulary, terms and symbols, getting started activities which serve as prerequisite skills in preparation for undertaking new objectives, strategies for teaching the new skills and student activities for providing reinforcement for the newly learned objective. Note that the lesson duration is included only as a guideline to the teacher for planning purposes. The actual time required for each module will vary from class to class and from child to child depending on the needs of the students and the teacher's judgment.

Priorities of Performance Objectives

There is an order of priority to be recognized in teaching the content presented in the CIMS NEW YORK CITY MATHEMATICS CURRICULUM. Performance objectives with the greatest priority are so basic that unless the student acquires a satisfactory degree of competency in them, the student cannot progress. Such topics are marked A and mastery by all pupils is essential.

Performance objectives marked B are required to be presented to all students. Mastery is not expected at this time. These objectives will be developed further and reinforced later.

Performance objectives marked C are of special interest. These should be taught to increase positive attitudes towards mathematics.

Summary: A - Mastery of this objective is essential for progress. Opportunities for reinforcement should be provided throughout the school year.

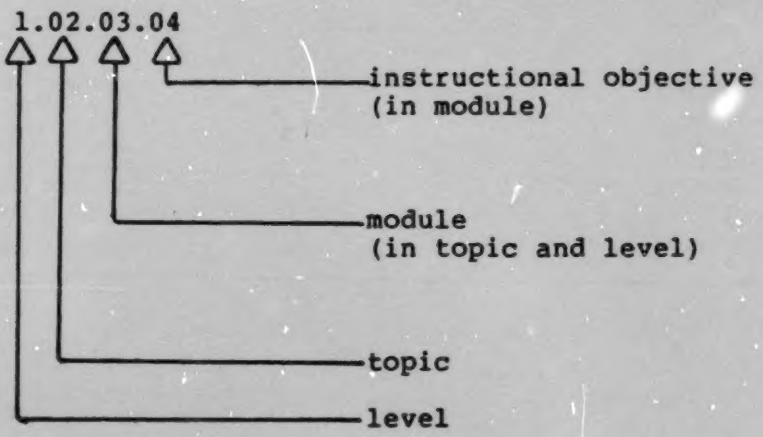
B - These objectives are to be taught to all pupils. Mastery is not essential at this time because the topics will be further developed and reinforced.

C - Objectives of special interest.

Topic Tab Key

01. Numbers and Numeration
02. Addition of Whole Numbers
03. Subtraction of Whole Numbers
04. Multiplication of Whole Numbers
05. Division of Whole Numbers
06. Fractions
07. Decimals
08. Integers
09. Geometry
10. Measurement
11. Algebraic Concepts
12. Graphs, Probability, Statistics
13. Problem Solving
14. Review

Module Coding Key


1.02.03.04
instructional objective (in module)
module (in topic and level)
topic
level

INSTRUCTIONAL SEQUENCE DESCRIPTION

An instructional sequence is given in list form on the following pages for this level. The sequence has been arranged to reflect what is considered the most effective presentation of the mathematics curriculum. Each module in the list is described by its unit number, module number, title, and page location.

The CIMS tests are integrated within the manual sequence. The test number is located in the first column. Each test is designed to assess priority objectives from the preceding modules. The tests are used to determine student mastery of specific performance objectives within these modules and appear in a multiple choice format. Each performance objective code number preceded by an * indicates that the performance objective is not tested on a CIMS test.

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INSTRUCTIONAL SEQUENCE - LEVEL 5

TEST NUMBER	UNIT NUMBER	MODULE NUMBER	TITLE	PAGE NUMBER
	1	5.09.01	Planes	1
	2	5.14.01	Place value	2
	3	5.01.01	Place value through hundred thousands	3
5.01	4	5.01.02	Round 6-digit numbers	4
	5	5.14.02	Addition	5
	6	5.02.01	Addition of two addends through 6-digit numbers	6
	7	5.14.03	Subtraction	7
	8	5.03.01	Subtraction through 6-digit numbers	8
5.02	9	5.13.01	Sets	9
	10	5.14.04	Fractions	10
	11	5.06.01	Equivalent fractions	12
	12	5.06.02	Greatest common factor (GCF) least common multiple (LCM)	14
	13	5.10.01	Measurement - linear - $\frac{1}{16}$"	15
5.03	14	5.10.02	Linear measurement - metric	16
	15	5.07.01	Decimals - thousandths	17
	16	5.07.02	Addition and subtraction of decimals through thousandths	18
	17	5.14.05	Multiplication	19
	18	5.04.01	Multiplication of multiples of ten by multiples of ten	20
	19	5.04.02	Multiplication of two 2-digit numbers	21
5.04	20	5.04.03	Multiplication of a 3-digit number by a 2-digit number	23
	21	5.14.06	Division	25
	22	5.05.01	Division of 5- and 6-digit dividends by 1-digit divisors	26

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INSTRUCTIONAL SEQUENCE - LEVEL 5

TEST NUMBER	UNIT NUMBER	MODULE NUMBER	TITLE	PAGE NUMBER
	23	5.09.02	Angles................................	28
	24	5.09.03	Angle measurement..........................	29
	25	5.10.03	Perimeter..............................	30
5.05	26	5.13.02	Use past knowledge to solve problems.......	31
	27	5.06.03	Multiplication of fractions................	32
	28	5.06.04	Multiplication of mixed numbers............	33
	29	5.12.01	Graphs................................	34
	30	5.12.02	Statistics - mean and median...............	35
5.06	31	5.01.03	Roman numerals to M.......................	36
	32	5.04.04	Multiplication of 4-digit numbers by 2-digit numbers.........................	37
	33	5.10.04	Area of a rectangular region...............	38
	34	5.05.02	Division of 5- and 6-digit dividends by 2-digit divisors....................	39
	35	5.13.03	Problem solving - missing information......	40
	36	5.09.04	Circles................................	41
5.07	37	5.12.03	Circle graphs............................	42
	38	5.09.05	Congruent and similar figures..............	43
	39	5.02.02	Addition - three or more numbers through 999,999................................	44
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	44	5.05.03	Division by multiples of 100...............	49
	45	5.05.04	Division by 3-digit divisors...............	50

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INSTRUCTIONAL SEQUENCE FOR LEVEL 5

TEST NUMBER	UNIT NUMBER	MODULE NUMBER	TITLE	PAGE NUMBER
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	47	5.06.05	Addition of fractions with unlike denominators	53
	48	5.06.06	Subtraction of fractions with unlike denominators	54
	49	5.10.05	Scale drawings	55
	50	5.01.05	Exponents	56
	51	5.11.01	Order of operations	57
5.09	52	5.10.06	Mass	58
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	54	5.10.08	Time - fractional relationships	60
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5.10	57	5.01.06	Place value through hundred millions	63
	58	5.04.05	Multiplication of 3- and 4-digit numbers by 3-digit numbers	64
	59	5.13.05	Problem solving - guess and check	65
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LEVEL 5

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CONTENT BY TOPIC

LEVEL 5

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5.06.02 Greatest common factor (GCF) least common multiple (LCM) 14
5.06.03 Multiplication of fractions 32
5.06.04 Multiplication of mixed numbers 33
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5.06.06 Subtraction of fractions with unlike denominators 54
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5.07.02 Addition and subtraction of decimals through thousandths 18
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5.07.04 Division of decimals through hundredths. 62

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5.09.02 Angles 28
5.09.03 Angle measurement 29
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5.10.02 Linear measurement - metric 16
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CONTENT BY TOPIC

LEVEL 5

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5.10.06 Mass................................... 58
5.10.07 Fractional linear measurement.......... 59
5.10.08 Time - fractional relationships........ 60
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5.13.02 Use past knowledge to solve problems.... 31
5.13.03 Problem solving - missing information... 40
5.13.04 Problem solving - lists and tables...... 47
5.13.05 Problem solving - guess and check....... 65

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5.14.02 Addition............................... 5
5.14.03 Subtraction............................ 7
5.14.04 Fractions.............................. 10
5.14.05 Multiplication......................... 19
5.14.06 Division............................... 25

Unit 1

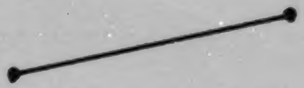
5.09.01 PLANES

(2 lessons)

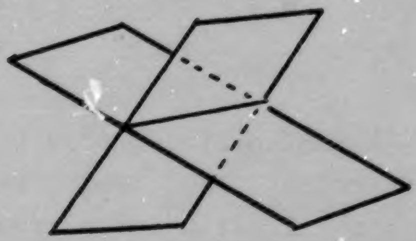
PERFORMANCE OBJECTIVES

The student will be able to...

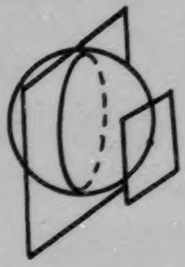
5.09.01.01B identify a plane as a flat surface which extends endlessly in all directions; it has the property that the line joining any two points of the plane lies entirely in the plane;
e.g.,



5.09.01.02B identify intersecting planes;
e.g.,



5.09.01.03B identify the intersections of planes and space figures.
e.g.,



5.09.01

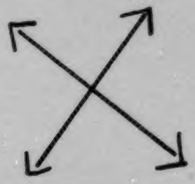
VOCABULARY

TERMS	**SYMBOLS**
point	.
line	—>
plane	

GETTING STARTED

Draw a dot on the chalkboard and say, "What does this represent?" (a point) Draw several more dots, not touching, but all in a straight path. Ask, "What will be formed if I continue to draw many more points until they are all touching one another?" (a line segment) If I continue the line segment indefinitely in both directions what will we get?" (a line) Continue this procedure. showing several examples of lines and line segments.

Draw several sets of lines on the chalkboard as follows.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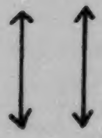
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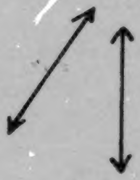
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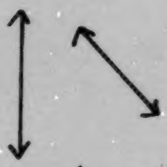

d

Say, "We have learned about two possibilities for lines: parallel lines and intersecting lines. Which set of lines seems to be parallel?" (set b) Elicit a definition and some examples of parallel lines. Say, "Which set or sets are intersecting lines?" (sets a, c and d) Elicit that intersecting lines either cross or will eventually cross. Discuss examples of intersecting lines.

5.09.01

5.09.01.01 identify a plane as a flat surface which extends endlessly in all directions; it has the property that the line joining any two points of the plane lies entirely in the plane

STRATEGY 1: Prepare a large piece of string about two feet long and a large ball, e.g., a basketball or beachball. Draw two dots (points) on the chalkboard about two feet apart. Say, "Is it possible for me to connect these two points with a line?" (Yes) Demonstrate by stretching the string between the two points. Hold up the ball and mark two points on it. Say, "Is it possible to connect these two points with a line segment?" Elicit from the students that it is not possible if you don't go through the inside of the ball. Say, "It was possible to connect the two points on the chalkboard but not on the ball because the chalkboard is a flat surface, and the ball has no flat surface." Identify a plane as a flat surface which we describe as extending endlessly in all directions. Elicit from the students examples of planes, e.g., piece of paper, surface of desk, floor.

STRATEGY 2: Prepare a selection of space figure models. Place the space figures, e.g., cube, rectangular prism, square pyramid, cone, cylinder, sphere, into a carton or large paper bag. Say, "I'm going to begin removing the space figures one at a time, and as I do, I'd like you to decide which ones belong together. We'll make as many piles as necessary as we sort them." Begin removing space figures one at a time and elicit from the students which ones they feel belong together. When all the figures have been removed from the carton, ask a student to

STRATEGY 2: cont'd

justify the method of sorting. Elicit that there are several correct or reasonable possibilities, e.g., prism vs. pyramids, sorting by number of faces, and sorting by size. If no one has suggested it, arrange the space figures so that all those made up only of plane figures are in one group, and all those having at least one curved surface (cone, cylinder, sphere) are in the other group. Elicit from the students the justification for sorting this way, and discuss the difference between plane and curved surfaces.

5.09.01.02 identify intersecting planes

STRATEGY 1:

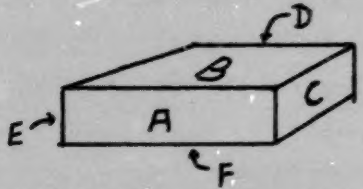
Say, "Look around the classroom. How many models of planes do you see?" Have the students name various models of planes, e.g., walls, floor, ceiling, desk tops, shelves, bookcases. Say, "We know that intersecting lines either cross or eventually cross one another. Can someone give the class a definition of intersecting planes?" Elicit from the students that intersecting planes either cross or will eventually cross one another. Have the students name several sets of intersecting planes.

Say, "How do we describe two lines which will never cross?" Elicit that they are parallel. Say, How would we describe two planes that will never cross?" Elicit that they are parallel. Ask the students to name several sets of parallel planes, e.g., floor and ceiling, front and back wall, desk top and floor. Continue to reinforce the idea that these are only models, that the planes extend

STRATEGY 1: cont'd indefinitely in all directions.

STRATEGY 2: Prepare a carton or large box with all six faces intact. Mark each face with a large letter, A through F.

e.g.,



Say, "How many plane surfaces are there on this carton? (6) Can someone name them? (A,B,C,D,E,F) If we were to extend all of the planes one foot in each direction, some of them would cut through each other. For example, plane A would cut through plane B. Which other planes would A cut through? (C,E,F) Just as we call lines that cut through each other intersecting, we call planes that cut through each other intersecting. Which plane will never cut through A, regardless of how far we extend it? (D) What do we call lines that never cut through each other? (parallel lines) What do you think we call planes that never cut through each other?" (parallel planes) Ask the students to list other sets of intersecting and parallel planes from the model.

5.09.01.03 **identify intersections of planes and space figures**

STRATEGY 1: Prepare some models of space figures which can be cut with a knife, e.g., cylindrical oatmeal box, standard cereal box, orange, and several sheets of oaktag or cardboard. Say, "We can create some interesting shapes by slicing these space figures

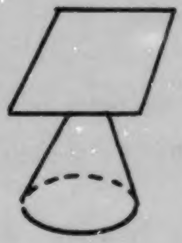
STRATEGY 1: cont'd

and these models of planes." Hold the cylinder up along with one piece of oaktag. Begin moving them towards one another, holding the oaktag parallel to the base of the cylinder. Say, "If I slice through the cylinder with this plane, what will be the shape of the cut?" (a circle) With the knife, carefully slice through the cylinder near the top and parallel to it. Show the cylinder to the students. Elicit that the cut is, in fact, in the shape of a circle.

Repeat the above procedure, using the following cuts:

> A plane cutting a cylinder at an angle will result in a cut (intersection) which is an elipse.
>
> A plane cutting a rectangular prism (standard cereal box) at any angle results in an intersection which is a rectangle.
>
> A plane cutting a sphere at any angle results in an intersection which is a circle.

STRATEGY 2: Prepare a set of space figure models, either plastic or wood, and a square of cardboard representing a plane. Hold up the model of the cone and the plane and say, "We can make some interesting discoveries about what happens when planes intersect with space figures." Rest the cardboard atop the cone as follows.

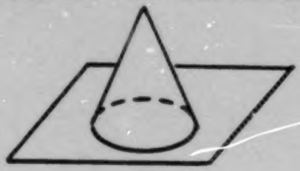


24

STRATEGY 2:
cont'd

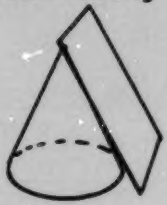
Say, "What part of the cone is the plane touching? (the point) We can say that when a plane intersects a cone in this way, the intersection forms a point."

Rest the cone on the cardboard as follows.



Say, "What part of the cone is the plane touching now? (the base, the 'circle,' the 'bottom') When a plane intersects a cone this way, we say the intersection forms a circle."

Lay the cardboard along the cone as follows.



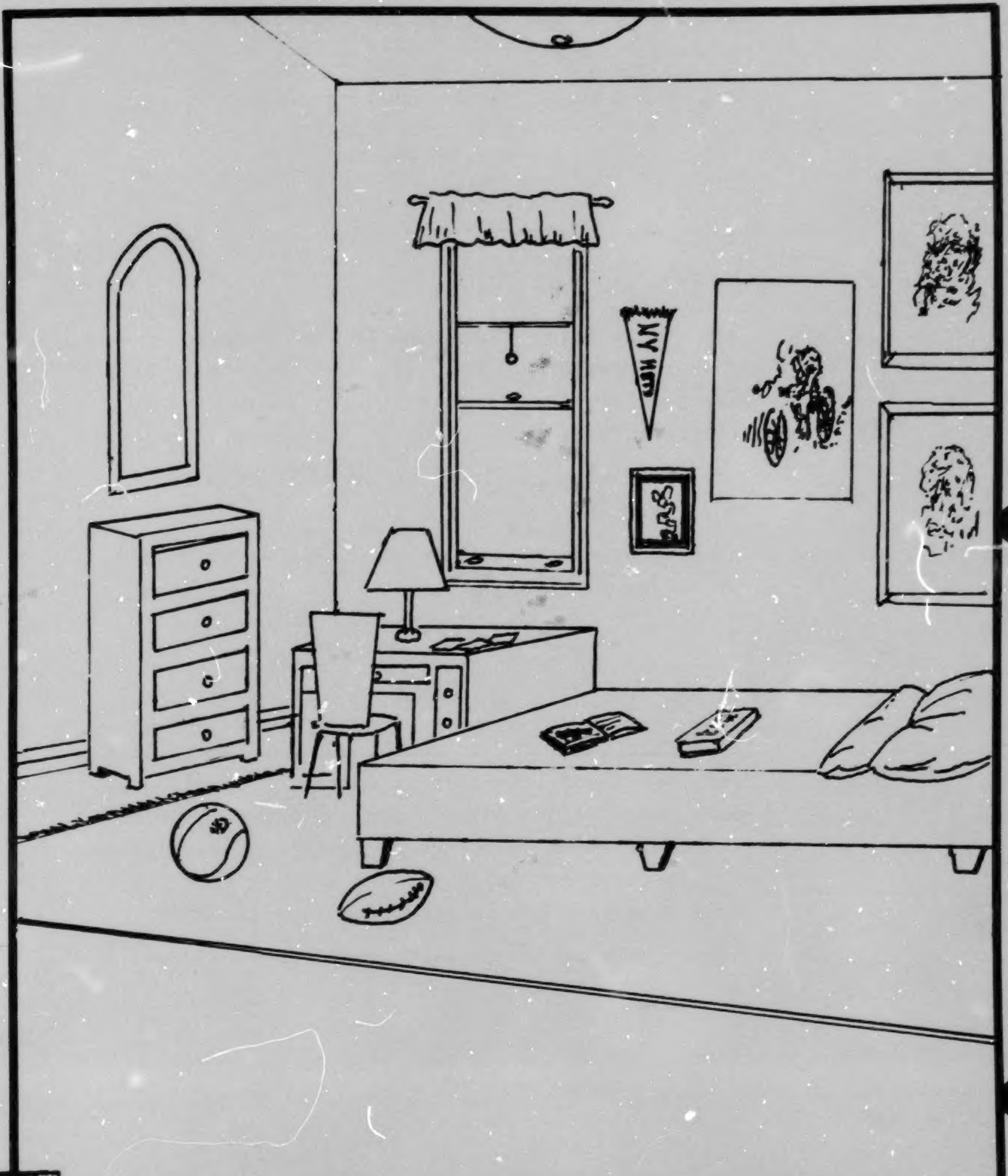
Say, "What part of the cone is the plane touching now? (the side) Is it touching the entire side? (no) Why not? (the side is curved) The plane is only touching one point along the entire side of the cone. What do points in a straight path form? (a line) We can say that when a plane intersects a cone this way, the intersection is a line."

Repeat this procedure with other space figures.

P.O. 5.09.01.01

NAME: ______________________________ **CLASS:** __________ **DATE:** ________

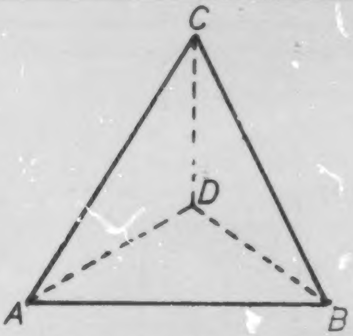
Directions: Select objects from the room which could be used as models for planes.



P.O. 5.09.01.02

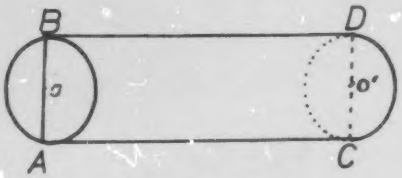
NAME:__________________________________CLASS:_________DATE:_______

Directions: In each figure name two sets of intersecting planes. If there are no sets of intersecting planes, write none beneath the picture.

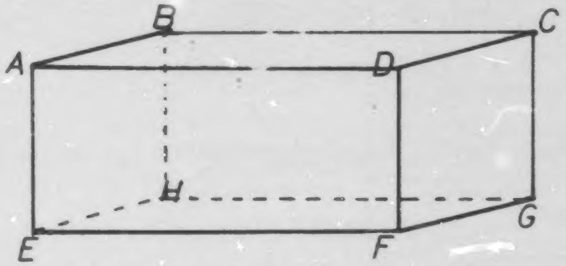


Intersecting planes are:

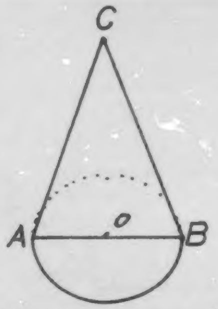
ABC & ABD ACD & BCD
ABC & ACD ACD & ABD
ABC & BCD BCD & ABD



Intersecting planes are:



Intersecting planes are:



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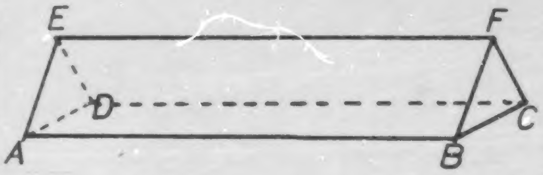
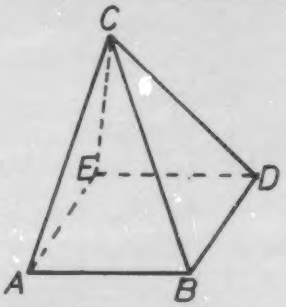


Intersecting planes are:



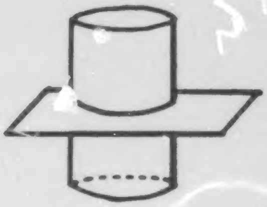
Intersecting planes are:

P.O. 5.09.01.03

NAME: ______________________________ CLASS: __________ DATE: ________

Directions: Circle each picture, showing the intersection between the space figure and the plane

①



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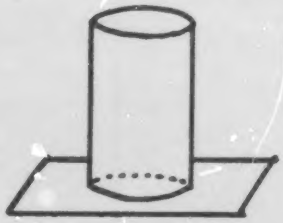

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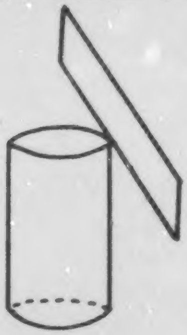

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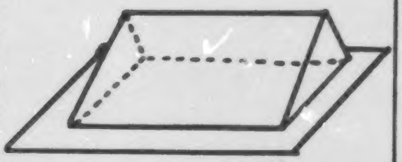

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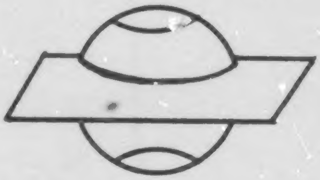

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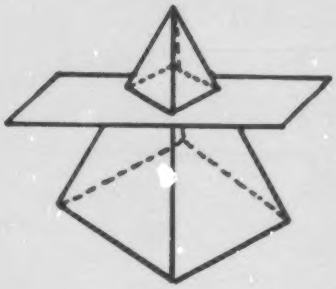

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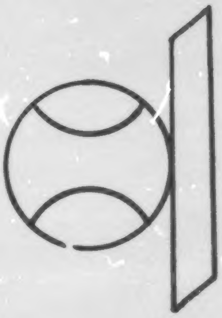

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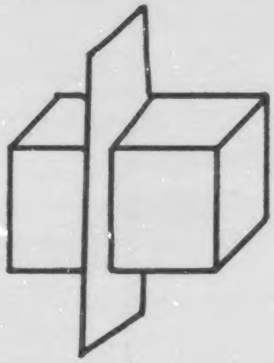

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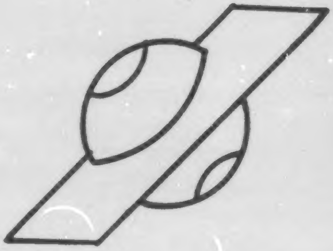


5.14.01 PLACE VALUE

(ongoing)

PERFORMANCE OBJECTIVES

The student will be able to...

5.14.01.01 identify and write the place value of numbers through 9999;
e.g.,

1 2 3 4
2 hundreds

5.14.01.02 identify and write a 4-digit number in expanded notation;
e.g.,

3562 = 3000 + 500 + 60 + 2

5.14.01.03 identify and write the number given the expanded form of 4-digit numbers through 1000.
e.g.,

1000 + 800 + 70 + 5 = 1875

5.14.01

VOCABULARY

TERMS

standard number
expanded number

GETTING STARTED

Prepare a set of squared material for each student. Draw a place value chart on the chalkboard, e.g. Hundreds Tens Ones. Write 362 on the chart. Say, "Make the representation for this number with your squared material." Ask a student to demonstrate at the front of the room by taping the pieces to the chalkboard. Say, "Why did you use three hundreds?" Elicit that we usually write digits in certain places because the place in which we write the digit represents its value.

Draw a place value chart on the chalkboard and prepare a set of cards numbered from 0 through 9.

Select a student to choose three cards. Say, "What number can you make using these cards?" Ask the student to write the number on the place value chart. Say, "The way we placed these cards tells us the value of each digit." e.g., Using the cards 3,5,6 the student could make the number 356. The value of this number would be 356. Had they placed the 6 first the number might be 653.

Continue this procedure, asking the students to identify the value of each digit.

[redacted]

5.14.01

5.14.01.01 identify and write the place value of numbers through 9 X 9999

STRATEGY 1: Prepare a set of cards numbered 0 - 9. Draw a place value chart through thousands on the chalkboard. Select a student to choose four cards, e.g., $\boxed{8}\boxed{6}\boxed{4}\boxed{2}$. Say, "What number could be written using these cards? There are many combinations, but if I place each digit in a different place in our chart I give each digit a value." Write on the chalkboard.

Th	H	T	O
8	6	4	2

Say, "What number do we have now? (8642). By placing a digit in a particular place we give the digit a value."

Ask a student to use the same cards and make the smallest number possible, e.g., 2468. Say, "The placement of each digit tells us the value of the digit."

STRATEGY 2: Draw a place value chart through thousands on the chalkboard and number a blank cube 0 - 6. Ask a student to come up and roll the cube and call out the number facing him/her, e.g., 6.

Write 6 in the thousands place. Continue this procedure until the chart contains four digits, e.g., 6, 0, 2, 1. Say, "What number did we make? (6021) How many thousands? (6) Hundreds? (0) Tens? (2) Ones? (1). The placement of each digit in a certain place determines its value." Continue this procedure.

5.14.01

5.14.01.02 **identify and write a 4-digit number in expanded notation**

STRATEGY 1: Prepare base ten material for each student and one set for demonstration. Write 1345 on the chalkboard. Say, "We are going to show the value of each digit using our material. Place one thousand cube on your desk. What is the value of this cube?" (1000) Ask a student to write the number on the chalkboard. Say, "Place 3 hundred squares next to the thousand cube." Ask a student to come to the front of the room and write the value of the three squares (300) next to the 1000. Say, "Place 4 ten strips and 5 unit pieces on your desk." Ask a student to write the value of the tens and the units, e.g., 1000 300 40 5. Say, "We have 1000 and (write a plus sign as you say and) three hundreds and forty and five in squared material (1000 + 300 + 40 + 5)." Point to the expanded number written on the chalkboard and say, "We have shown the value of each digit in the number we started with. When we express a standard number this way we have written it as an expanded number."

STRATEGY 2: Prepare a card for each student, and on each card write a different 4-digit number. Distribute the cards and select a student to read his/her number, e.g., 3285. Say, "How many thousands are in your number?" (3) "How can we write this as a numeral?" Ask a student to come to the chalkboard and write 3000. Say, "What does the 2 stand for?" (200) Ask a student to write 200. Continue for the remaining digits.

STRATEGY 2: cont'd

At the chalkboard place a plus sign between each number, e.g., 1000 + 300 + 80 + 15. Say, "We have shown that the number 3285 means 3000 + 200 + 80 + + 5."

Ask the students to use their cards and write their expanded numbers. The students can exchange cards and then check to see that they all have written their expanded number. Ask several students to come to the chalkboard to write their original and expanded numbers.

5.14.01.03 **identify and write the number given the expanded form of 4-digit numbers through 1000**

STRATEGY 1:

Prepare a 4x4 grid for each student, scissors and paste. Distribute the materials to each student. Say, "Write 4000 on the first line 4 0 0 0 , 300 on the second line 3 0 0 , 20 on the third line 20, and 6 in the fourth line 6. Cut the grid into four strips and cut off any boxes without a digit. Which strip is the longest? (4000) Place it flat on your desk. Which strip is next? (300) Put the 300 on top of the 4000 so that the 4 still shows, and paste it down. What number do we have now?" (4300) Continue this procedure until the number 4326 is made. Say, "What number do we have now? We went from the expanded form of this number to the standard form. We added 4000 + 300 + 20 + 6."

STRATEGY 2:

Prepare squared material or multi-base blocks. Show 3000 + 900 + 80 + 2 using the material. Ask a student to count the pieces while you write the

STRATEGY 2:
cont'd

expanded number on the chalkboard. Draw a place value chart through thousands next to the expanded number. Ask a student to rewrite this number in the place value chart. e.g., $\begin{array}{c|c|c|c} T & H & T & O \\ \hline 3 & 9 & 8 & 2 \end{array}$. Say, "Can you write his number in standard form?" (3982) Ask a student to write the number. Say, "We really had an addition example because our standard number is the sum of the thousands, hundreds, tens, and ones." Continue this procedure.

P.O. 5.14.01.01

NAME: ________________________ CLASS: ________ DATE: ________

Directions: I What does the circled digit stand for? Write your answer two ways.
II Write the standard numeral.

TH	H	T	O	
5	1	④	0	5140

A. 5 1 ④ 0 4 tens
40

B. ① 0 1 0 ________
____

C. 7 ⑥ 8 3 ________
____

D. 6 3 5 ⑧ ________
____

E. ③ 5 6 1 ________
____

F. 4 2 ⑨ 6 ________
____

G. 9 ③ 4 9 ________
____

H. 8 ⑦ 5 3 ________
____

I. 9 ⑨ 9 9 ________
____

J. 4 5 ⑥ 7 ________
____

II. a. four thousand six hundred fifty three 4,653

b. eight thousand three hundred twenty ________

c. four thousand forty ________

d. nine thousand three hundred thirty eight ________

e. seven thousand five hundred sixty six ________

P.O. 5.14.01.02

NAME:________________________ CLASS:________ DATE:________

Directions: Write each number in expanded form.

A. 5862 5000 + 800 + 60 + 2

B. 8166 ____ + ___ + __ + ___

C. 9835 ____ + ___ + __ + ___

D 7474 ____ + ___ + __ + ___

E. 6928 ____ + ___ + __ + ___

F. 1839 ____ + ___ + __ + ___

G. 6458 ____ + ___ + __ + ___

H. 8364 ____ + ___ + __ + ___

I. 2142 ____ + ___ + __ + ___

J. 7869 ____ + ___ + __ + ___

5000+800+60+2

P.C. 5.14.01.03

NAME: ____________________ CLASS: __________ DATE: ________

Directions: Write the standard numeral then use the key to break the code.

Key

A	B	C	E	F	H	M	N	T	U
7469	3574	8297	5678	8943	8391	5064	4753	6834	6869

5000+60+4

5064

M

7000+400+60+9

6000+800+30+4

8000+300+90+1

8000+200+90+7

7000+400+60+9

4000+700+50+3

3000+500+70+4

5000+600+70+8

8000+900+40+3

6000+800+60+9

4000+700+50+3

5.01.01 PLACE VALUE THROUGH HUNDRED THOUSANDS

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.01.01.01A identify and write the place value of numbers through hundred thousands; e.g.,

173,462 7 ten thousands
465,108 5 thousands

5.01.01.02A compare two 6-digit numbers using the correct relation symbol (<, >). e.g.,

154,631 < 272,376

5.01.01

VOCABULARY

TERMS	SYMBOLS
is equal to	=
is less than	<
is greater than	>
place value	

GETTING STARTED

Write a 3-digit number on the chalkboard, e.g., 865. Elicit the value of each digit. Ask a student to place the digits 865 onto a place value chart that has been drawn on the chalkboard. Ask students to read the value of each digit.

a) The digit (8) has a value of 800.
b) The digit (6) has a value of 60.
c) The digit (5) has a value of 5

Hundreds	Tens	Ones
8	6	5

Repeat this procedure using other numbers.

Give each student two index cards like these, $\boxed{<}$, $\boxed{>}$, and two others, each of which contains a different 3-digit number. Say, "Select the appropriate sign, and place it between the two numbers, e.g., $\boxed{473}\ \boxed{<}\ \boxed{525}$." Ask the students to exchange their cards with each other.

5.01.01

5.01.01.01 **identify and write the place value of numbers through hundred thousands**

STRATEGY 1: Have the students prepare a set of ten index cards numbered 0 through 9 and a place value chart through hundred thousands. The students will use the cards to build a number in the place value chart. Say, "We will build a 6-digit number. Put the 2 in the ten thousands place, 8 in the thousands place, 4 in the ones place, 6 in the hundred thousands place, 7 in the tens place, and 9 in the hundreds place."

Select a student to read the number, e.g., 628,974. Write the number on the chalkboard. Say, "What is the value of the digit 6 in this number? How many ten thousands are in one hundred thousand?" This may be shown on the chalkboard by adding ten (10) ten thousands. Continue this procedure using other numbers.

STRATEGY 2: Ask students to prepare a set of ten index cards numbered 0 through 9. Ask the students to select any six cards. Tell the students to build the greatest number possible, the smallest number possible, and three different numbers between the smallest and the greatest number.

e.g.,

Using the digits 1, 2, 3, 4, 5, 6,
654,321 = greatest number
123,456 = smallest number

5.01.01

5.01.01.02 **compare two 6-digit numbers using the correct relation symbol (<, >)**

STRATEGY 1: Write a series of numbers on the chalkboard and ask individual students to go to the chalkboard and fill in the correct symbol, <, >. Use the following numbers.

535 275 473 315 315 439 250 510

After the correct symbols are filled in, write the following on the chalkboard.

535,000 473,000 315,000 250,000
275,000 315,000 439,000 510,000

Ask the students to come to the chalkboard and fill in the correct symbol.

STRATEGY 2: Write two 6-digit numbers on the chalkboard, e.g., 987,654; 321,987. Ask the students to count the number of digits in each number. Ask the students to observe the leftmost digit of the two numbers being compared. Stress that the first number 987,654 has the greater first digit. In the second number 321;987 the first digit is less than 9. When the number of digits in the numbers being compared are equal, the number which has the greater leftmost digit is the greater number and vice versa.

Write the following on the chalkboard.

146,000 136,275

Ask the students to look at the first digit of both numbers. It is the same. Explain that in this case, we compare the digits to the right of the first digit. Therefore, 146,275 > 136,275 because the digit 4 in the ten thousands place is greater than the digit 3 in the ten thousands place.

5.01.01

STRATEGY 2: cont'd

Write the following example on the chalkboard.

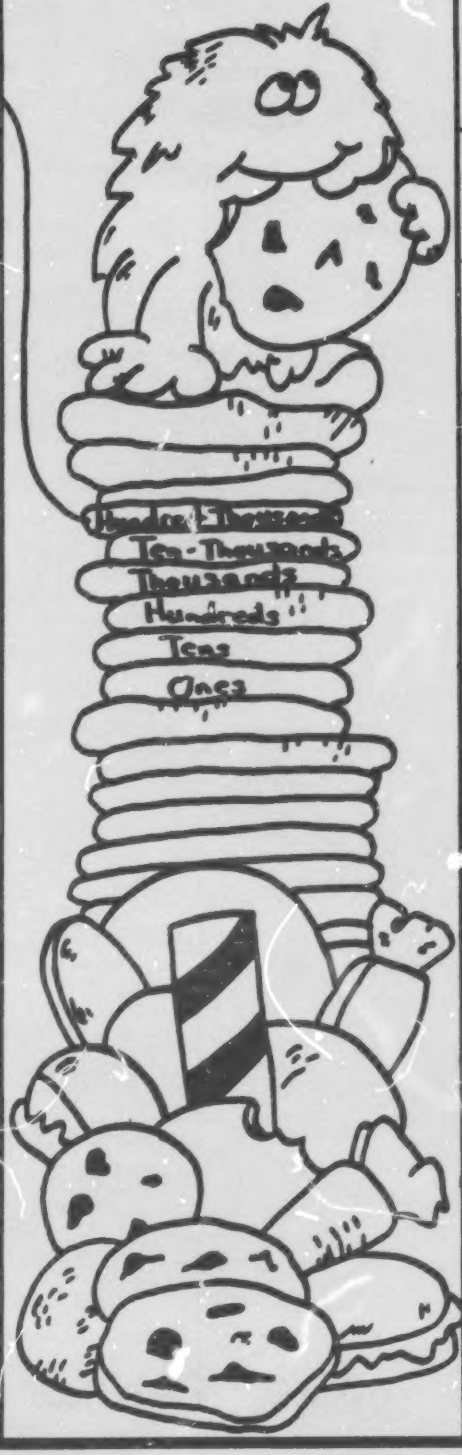
176,325   46,275

Ask the students to count the number of digits in the first number. Since 6 digits > 5 digits, a 6-digit number is greater than a 5-digit number, e.g., 176,325 > 46,275. Similarly, 240 < 3,721 because 3 digits < 4 digits. Place examples of the above on the chalkboard and ask the students to identify the correct relation symbol and explain their answers.

P.O. 5.01.01.01

NAME: ____________________ CLASS: ________ DATE: ________

Directions: Match the value of the underlined digit to its name. Write the expanded value of the underlined digit.

Numeral		Value
352,637	 Hundred Thousands Ten-Thousands Thousands Hundreds Tens Ones	300,000
438,525		
820,136		
935,437		
243,710		
865,284		
270,305		
934,865		
438,217		
501,352		

P.O. 5.01.01.02

NAME:____ CLASS:__________ DATE:________

Directions: Fill in the circle with the correct sign < or > .

802,763	>	430,205	234,829	○	234,729
952,713	○	357,216	628,486	○	630,422
100,351	○	300,351	783,512	○	782,512
457,824	○	357,216	686,424	○	687,424
865,213	○	763,246	300,208	○	300,207
327,815	○	532,705	128,112	○	200,400
463,276	○	832,716	283,637	○	273,636
121,318	○	112,318	428,111	○	428,101
202,408	○	220,408	829,123	○	830,002
334,512	○	333,512	901,208	○	902,208

Unit 4

5.01.02 ROUND 6-DIGIT NUMBERS

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.01.02.01A round 6-digit numbers to the nearest ten thousand;

e.g.,

38,464 rounds to 40,000

73,752 rounds to 70,000

5.01.02.02A round 6-digit numbers to the nearest hundred thousand;

e.g.,

645,721 rounds to 600,000

391,112 rounds to 400,000

5.01.02.03A solve word problems related to skills learned in this module.

e.g.,

171,348 people attended the concert in Central Park. If this number is rounded to the nearest hundred thousand, about how many people attended the concert?

About 200,000 people attended the concert.

5.01.02

VOCABULARY

TERMS

rounding
approximate
interval

GETTING STARTED

Say, "There are 33 pupils in our class today. About how many pupils are present today? 20, 30 or 40? (30) The lunchroom will feed 841 pupils this afternoon. Approximately how many pupils will eat lunch? 700, 800 or 900? (800) A pair of new running shoes costs $49.85. About how much will they cost? $40, $50 or $60? ($50) Sometimes it is helpful to use numbers that give us an approximate idea of what we are talking about. These approximate numbers are called rounded numbers."

Draw a number line numbered in intervals of tens on the chalkboard from 1,600 through 1,700. Say, "Is 1,670 closer to 1,600 or 1,700?" Elicit that 1,670 is closer to 1,700. Mark 1,670 on the number line.

<————————————————————————————>

1,600 1610 1620 1630 1640 1650, etc...

Repeat this procedure several times using the number line. Say, "When we say a number is closer to one end of the number line than the other end, we are rounding the number. In this case we have rounded the number to the nearest hundred." Stress the importance of 1,650, which is exactly in the middle of 1,600 and 1,700. Say, "When a number is 1,650 (or more) it is rounded up to 1,700." Give additional examples in which the number to be rounded is exactly in the middle of the rounded choices.

5.01.02

5.01.02.01 **round 6-digit numbers to the nearest ten thousand**

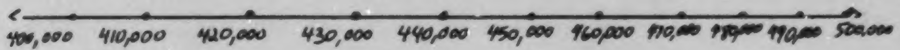
STRATEGY 1: Write a 6-digit number, e.g., 328,250, on the chalkboard. Ask the students to read this number. Identify and label the place value of each digit in this number.

e.g.,

H Th	T Th	Th	H	T	O
3	2	8	2	5	0

Say, "When we round to the nearest ten thousand we look at the number in the thousands place (8). If the digit is 5 or more, round the number in the ten thousands place to the next highest number, making all the numerals in the places to the right (thousands, hundreds, tens, and ones) zeros. If the number in the thousands place is 4 or less the ten thousands place remains the same and all numbers in the places to the right (thousands, hundreds, tens, and ones) become zeros. Say, "Is 8 higher than 5? (Yes) If the thousands place is 5 or more do we round up or down?" (Up) Elicit from the students that 328,250 rounds to 330,000. Continue this procedure using other numbers.

STRATEGY 2: Draw a number line on the chalkboard, starting at 400,000, through 500,000 numbered in multiples of ten thousand:



Say, "458,742." Write this number on the chalkboard. Say, "Who can tell us the value of each interval on the number line? (10,000) We are going to round some numbers to the nearest ten thousand. Where does the number belong on the

STRATEGY 2: cont'd

number line?" Point to 458,742. Say, "What two numbers is it between? (450,000 and 460,000.) How do we decide which number it rounds to?" Remind the students that when rounding to the nearest ten thousand they are to look at the digit in the thousands place. If this digit is 5 or more, round the number in the ten thousands place (5) to the next highest ten thousand (6) and all the digits to the right (thousands, hundreds, tens, and ones) become zeros. If this digit is 4 or less, the ten thousands remains the same and all digits to the right (thousands, hundreds, tens, and ones) become zeros. Say, "458,742 rounds to 460,000." Repeat this procedure using other examples.

5.01.02.02 **round 6-digit numbers to the nearest hundred thousand**

STRATEGY 1: Write a 6-digit number such as 425,130 on the chalkboard. Ask a student to read this number aloud. Identify and label the place value of each digit in this number.

H Th	T Th	Th	H	T	O
4	2	5	1	3	0

Explain that in rounding to the nearest hundred thousand you look at the digit in the ten thousands place. Point to the 2 in the number 424,130. Say, "If the digit is 5 or more, round the hundred thousands to the next highest numeral making all the digits to the right (ten thousands, thousands, hundreds, tens, and ones) zeros. If the number in the ten thousands place is 4 or less, the numeral in the hundred thousands place remains the same and

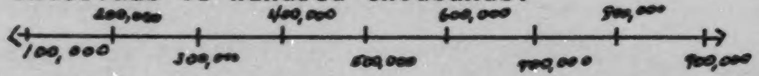
STRATEGY 1: cont'd

all digits to the right (ten thousands, thousands, hundreds, tens, and ones) become zeros. What is the digit in the ten thousand place?" (2) "Is it greater or less than 5?" (Less) "Do we round up or does the hundred thousands place stay the same?" (Same) "What does 425,130 round to?" (400,000)

Continue this procedure using other numbers, circling the ten thousands place.

STRATEGY 2:

Draw a number line on the chalkboard numbered in intervals of hundred thousands.



Say, "732,100." Write this number on the chalkboard. Say, "We are going to round some numbers to the nearest hundred thousand." Point to the number 732,100. Say, "Where does the number belong?" (between 700,000 and 800,000) How do we decide which number it is closer to?" Remind the students that when rounding to the nearest hundred thousand they are to look at the number to the right of the hundred thousands place. Say, "If this number is 5 or more, round the digit in the hundred thousands place to the next highest digit, making all the digits to the right (ten thousands, thousands, hundreds, tens, and ones) zeros. If this digit is 4 or less, the digit in the hundred thousands place remains the same and all the numbers to the right (ten thousands, thousands, hundreds, tens, and ones) become zeros. What digit is in the ten thousands place?" (3) "Is it greater or less than 5?" (Less.) "Do we round the hundred thousands place up or does it remain the same?" (Same.) "732,100 rounds to 700,000."

Continue this procedure using other numbers.

5.01.02

5.01.02.03 **solve word problems related to skills learned in this module**

STRATEGY 1: Say, "There were 242,165 franks sold at yesterday's baseball game. Who can tell me about how many franks were sold, rounding this number to the nearest ten thousand?" (240,000) Review the rules for rounding. Say, "First find the place to which you are rounding (10,000). Next, look at the digit to the right of the ten thousand place. What is it?" (2) "If that digit is 5 or greater, round up. If that digit is less than 5, round down, making the digits to the right (thousands, hundreds, tens, and ones) zeros."

Say, "The highest mountain peak in the world is Mount Everest. It is 29,028 feet high. Round this number to the nearest thousand. Remember to check the hundreds place before you make your decision. Mt. Everest is about 29,000 feet high." If necessary, point out that 0 is less than 5.

STRATEGY 2: Divide the class into teams. Give each team problems to round to the nearest ten thousand. Have the students solve the problems. Select a student from one team to come to the chalkboard with the answer to one of his team's problems. If he/she is correct, the team earns a point. Then a member of the next team takes a turn. A member of one team may challenge another team's answer. If the challenger is correct, the challenger's team earns a point. The first team to reach seven points wins.

STRATEGY 2: cont'd

Ideas for problems:

1) number of visitors to a park function;
2) circulation of newspapers, magazines;
3) items of food sold at a fast food restaurant;
4) number of items of clothing made by a manufacturer.

P.O. 5.01.02.01

NAME:__________________________________CLASS:_________DATE:_______

Directions: Part I Round each number to the nearest ten thousand.
Part II Rewrite each headline rounding the numbers to the nearest ten thousand.

34,830 ____________

41,640 ____________

76,106 ____________

147,605 ____________

354,299 ____________

208,450 ____________

621,290 ____________

851,485 ____________

479,100 ____________

535,645 ____________

The Board of Education will spend $268,104 on books for pupils.

The New York Mets had 53,105 spectators attend yesterdays game.

The Federal Government will hire 121,093 new workers to help rebuild city streets throughout the country.

P.O. 5.01.02.02 ____________

NAME: ______________________________ CLASS: __________ DATE: ________

Directions: Round numbers to the nearest ten thousand and hundred thousand.

I. Round each number to the nearest ten thousand:

1) 26,400 ________ 2) 31,326 ________

3) 42,560 ________ 4) 71,344 ________

5) 56,000 ________ 6) 563,901 ________

III. Round each number to the nearest hundred thousand:

1) 201,840 ________ 2) 740,516 ________

3) 864,300 ________ 4) 453,275 ________

5) 387,217 ________ 6) 829,037 ________

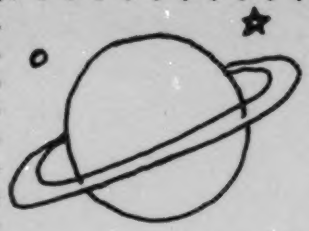
III. Complete the following chart:

	Rounded to the nearest	
Number	ten thousand	hundred thousand
782,678		
939,620		
839,412		
531,426		
606,065		
708,094		
231,412		
385,991		

P.O. 5.01.02.03

NAME: ______________________ CLASS; ______ DATE: ______

Directions: Round to the place shown.



Rounding Numbers: round to the place shown.

1. The diameter of Saturn is about ________ miles (thousands)
   74,187

2. The diameter of Jupiter is about __________ (ten thousand)
   887,712

3. The moon is approximately __________ miles from earth (ten thousand)
   247,667

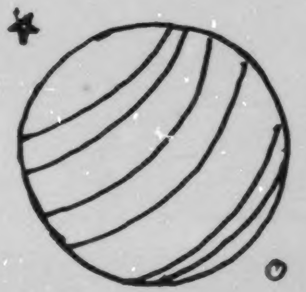
4. The Earth is about __________ miles from the sun (hundred thousand)
   9[illegible],876,421

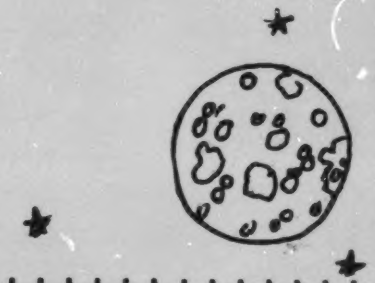
Round to the nearest hundred

2,364 8,451 7,290 5,745 6,720

Round to the nearest thousand

21,645 34,265 54,980 72,150





5.14.02 ADDITION

(ongoing)

PERFORMANCE OBJECTIVES

The student will be able to...

5.14.02.01 compute sums of 2- and 3-digit numbers without exchange;

e.g.,

$$\begin{array}{r} 23 \\ +56 \\ \hline 79 \end{array} \qquad \begin{array}{r} 472 \\ +315 \\ \hline 787 \end{array}$$

5.14.02.02 compute sums of 2- and 3-digit numbers with exchange.

e.g.,

$$\begin{array}{r} \scriptstyle 1 \\ 48 \\ +35 \\ \hline 83 \end{array} \qquad \begin{array}{r} \scriptstyle 1 \\ 657 \\ +235 \\ \hline 892 \end{array}$$

5.14.02

VOCABULARY

TERMS

addend

GETTING STARTED

Draw a group of 3 circles and a group of 4 circles on the chalkboard. Say, "How do we know how many circles are on the chalkboard?" Elicit from the students that we can count them one at a time or add the two groups. Write several basic addition facts on the chalkboard; e.g., $\begin{array}{r}4\\+3\\\hline\end{array}$, $\begin{array}{r}3\\+4\\\hline\end{array}$. Point out that in addition the order of the addends does not change the sum.

Write addition examples using a one place number plus zero on the chalkboard; e.g., $\begin{array}{r}6\\+0\\\hline\end{array}$, $\begin{array}{r}7\\+0\\\hline\end{array}$, $\begin{array}{r}9\\+0\\\hline\end{array}$. Ask a student to write the correct sum under each example. Say, "When we add zero to any number the sum is that same number.

5.14.02

5.14.02.01 **compute sums of 2- and 3-digit numbers without exchange**

STRATEGY 1: Prepare and distribute squared material to each student. Write following examples on the chalkboard.

$$\begin{array}{r} 23 \\ +\underline{56} \end{array} \qquad \begin{array}{r} 472 \\ +\underline{315} \end{array}$$

Ask the students to look at the first example.

Say, "In the number 23, how many tens and ones are there?" Elicit that there are 2 tens and 3 ones.

Say, "Use your squared material and make the number 23." Repeat this procedure for 56.

Ask the students to group their unit pieces together.

Say,"When we add numbers we always start in the ones place. How many ones do we have in all? (9) Now join the tens. How many tens do we have in all? (7) What new number did you make by joining the groups?" (79) Ask a student to write 79 under the bar in the example on the chalkboard. Continue this procedure with other 2- and 3-digit numbers.

STRATEGY 2: Write the following example on the chalkboard.

$$\begin{array}{r} 123 \\ +\underline{345} \end{array}$$

Say,"When we add we always start in the ones column. What digits are in the ones column? (3,5) How much does 3+5=☐?" (8) Write the 8 in the ones column. Point out to the students that it is important to keep their columns straight. Continue this procedure adding the tens and hundreds columns. Say, "When we added 123 and 345 together

STRATEGY 2: cont'd our sum was 468. We joined the addends to arrive at the sum." Continue this procedure using other 2- and 3-digit numbers.

5.14.02.02 **compute sums of 2- and 3-digit numbers with exchange**

STRATEGY 1: Prepare and distribute squared material to each student. Write the following example on the chalkboard.

$$\begin{array}{r} 39 \\ +\underline{27} \end{array}$$

Ask the students to show these numbers with the squared material. Say, "We are going to combine this material to help us add. Put your unit squares together first, because we always start addition in the ones column. How many unit squares do you have? (16) Can we write 16 in the ones column? (no) What we must do is exchange ten units for one tens strip. Put the tens strip with your other tens and count the remaining ones. How many ones are left?" (6) Show this at the chalkboard.

e.g.,

$$\begin{array}{r} 39 \\ +\underline{27} \\ 6 \end{array}$$

Say, "Now add all of your ten strips." (6) Write 6 on the chalkboard. Say, "What is our answer? (66) We know from our understanding of place value that no place can have a digit higher than 9; therefore, when we have a digit higher than 9, we must exchange the ten smaller pieces for one large piece." Continue this procedure using other 2- or 3-digit numbers.

5.14.02

STRATEGY 2: Prepare play money and distribute. Write the following example on the chalkboard.

$$\begin{array}{r} \$2.36 \\ \underline{+4.71} \end{array}$$

Say, "Use your play money to show $2.36. How many dollars do you have? (2) Dimes? (3) Pennies? (6). Now make $4.71." Elicit from the students that they have 4 dollars, 7 dimes, and 1 penny.

Say, "Add the pennies. How many do you have?" (7) Write the seven in the example.

$$\begin{array}{r} \$2.36 \\ \underline{+4.71} \\ 7 \end{array}$$

Say, "Add the dimes. How many dimes do you have?" (10) We cannot have a digit higher than 9 in any place so what must we do?" Elicit from the students that they can exchange ten dimes for one dollar. Ask the students to make the exchange and place the dollar with their other dollars.

Say, "How many dimes are left?" (0) Show this step on the chalkboard.

$$\begin{array}{r} \$2.36 \\ \underline{+4.71} \\ .07 \end{array}$$

Say, "Add your dollars. (7) Our answer to this problem is $7.07." Show this on the chalkboard.

$$\begin{array}{r} \$2.36 \\ \underline{+4.71} \\ \$7.07 \end{array}$$

Continue this procedure using other numbers.

P.O. 5.14.02.01

NAME: ______________________ CLASS: ________ DATE: ________

Directions: Add. Then use the key to answer the riddle.

What Is A Boxer's Favorite Drink?

58 +21 79 F	324 +155	52 +36	720 +269	354 +425
36 +63	21 +67	360 +409	123 +321	234 +561

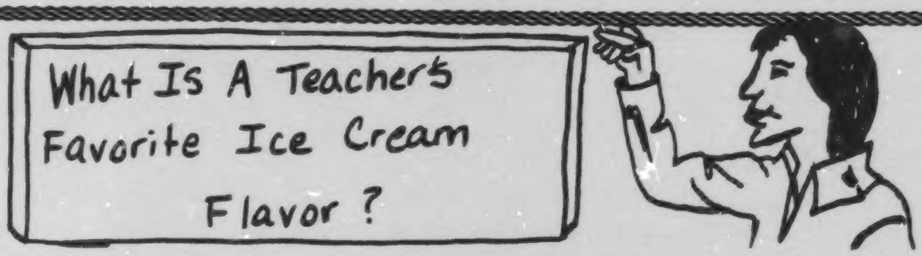
Key

T	C	F	H	I	N	P	R	U
779	444	79	795	989	769	99	479	88

P.O. 5.14.02.02

NAME:________________________________ CLASS:__________ DATE:________

Directions: Add. Use the key to answer the riddle.


What Is A Teacher's
Favorite Ice Cream
Flavor ?

a. 173 + 242 415	b. 653 + 238	c. 27 + 46
d. 65 + 27	e. 519 + 381	f. 192 + 641
g. 206 + 209	h. 296 + 385	i. 261 + 572

Key	A	C	E	H	K	L	T
	415	891	73	92	900	833	681

___	___	A	___	___	-	___	___	___	___
b	d	g	f	c		i	g	h	c

Unit 6

5.02.01 ADDITION OF TWO ADDENDS THROUGH 6-DIGIT NUMBERS

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.02.01.01A add two 6-digit numbers with regrouping in any column (including money) and check;

e.g.,

11 1	check
507,996	632,517
+124,521	507,996
632,517	124,521

5.02.01.02B estimate by rounding addends to the largest possible place;

e.g., 113,246 rounds to 100,000
+342,125 rounds to 300,000
400,000

5.02.01.03A solve word problems related to skills learned in this module.

e.g., John builds model bridges. Last month he used 124,890 toothpicks. This month he used 224,125 toothpicks. How many toothpicks did he use in all?

estimate	add	check
100,000	124,890	224,125
+200,000	+224,125	+124,890
300,000	349,015	349,015

5.02.01

VOCABULARY

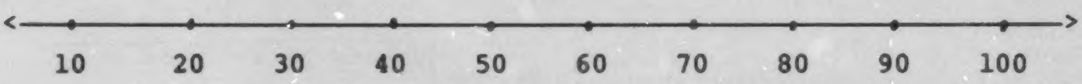
TERMS

addend
sum

GETTING STARTED

Review rounding numbers to the nearest ten and the nearest hundred. Construct a number line on the chalkboard.

e.g.,



Say, "Where would 33 be on this number line? Between which pair of tens is it located?" (30 and 40) "To which ten is it closer?" (30) Recall with students that if the number is before the midpoint, e.g., 35, we say it is closer to 30. But if it is at the midpoint between the two tens or after it, we round it to the higher ten.

Prepare a number line counting by hundreds and follow the same procedure, asking the students to round 3-digit numbers to the nearest hundred.

Review renaming using a place value chart.

e.g.,

hundred thousand	ten thousand	thousand	hundreds	tens	ones
			2	4	0
		4	1	0	0

Ask the students to name 24 tens another way. Elicit from the students that we cannot write two (2) digits in one place. Therefore, only the 4 can be written in the tens place, while the 2 must be written in the hundreds place. Therefore, 24 tens can also be expressed as 2 hundreds and 4 tens. Repeat with other examples, e.g., 41 hundreds = 4 thousands and 1 hundred.

5.02.01

5.02.01.01 **add two 6-digit numbers with regrouping in any column (including money) and check**

STRATEGY 1: Make a pocket chart with six pockets out of oaktag or construction paper. Cut construction paper into pieces about six inches long and two inches wide to be used in the pockets of the chart. Use six different colors of construction paper, one for each place value, e.g., red strips for the ones place, blue strips for the tens place, ...

pocket chart

Hundred Thousands	Ten thousands	Thousands	Hundreds	Tens	Ones

Say, "An airplane traveled 236,495 miles last year. This year that same airplane flew 195,442 miles. How many miles did the airplane fly all together?" Elicit from the students that addition is required to solve this problem. Ask a student to write the addends on the chalkboard.

$$\begin{array}{r} 236{,}495 \\ \underline{+195{,}442} \end{array}$$

Ask another student to use the colored strips to represent the top addend in the pocket chart; (two yellow strips in the hundred thousands pocket; three green strips in the ten thousands pocket; six purple strips in the one thousands pocket; four orange strips in the hundreds pocket; nine blue strips in the tens pocket; and five red strips in the ones pocket). Another student represents the lower addend in the same pocket chart so that both amounts are represented together. Ask a student to come to the pocket chart and count all the strips in the ones place (7) and then go to the example on the chalkboard and total the digits in the ones place (7).

STRATEGY 1: cont'd

Repeat this procedure for the strips in the tens place, asking a student to rename the 13 tens as 1 hundred and 3 tens by trading ten of his blue strips for one orange strip which is placed in the hundreds pocket. The student then totals the digits in the tens place on the chalkboard example, noting the regrouping of 10 tens for one hundred and listing it in the hundreds column. Repeat this procedure until the final sum is reached. Ask another student to come to the chalkboard to check this sum by writing the lower addend on top and the top addend below it to form a new example.

$$\begin{array}{r} 195,442 \\ \underline{+236,495} \end{array}$$

Ask a student to find the sum, checking to see if it is the same as the sum in the first example.

Repeat with other 6-digit numbers.

STRATEGY 2:

Say, "A movie theater sold $4,356.25 worth of tickets to the Friday night show and $3,641.55 worth of tickets to the Saturday afternoon show. How much did the theater make for both shows?" Elicit from the students that addition is required to solve this problem.

Construct a place value chart on the chalkboard.

$ 1000.00	$ 100.00	$ 10.00	$ 1.00		10 ¢	1 ¢
(Thousend dollar bills)	(Hundred dollar bills)	(Ten dollar bills)	(one dollar bills)		(dimes)	(pennies)
4	3	5	6	.	2	5
+ 3	6	4	1	.	5	5

Ask a student to write the addends in the place value chart. Ask another student to total the digits in the 1¢ column by saying, "How many pennies in all?" When the student counts 10 pennies (5 + 5 = 10), ask if we can trade that for

STRATEGY 2: cont'd

a different coin. Elicit that ten pennies can be exchanged for one dime, with no pennies left over. Ask the student to put a zero in the pennies place and put an extra 1 in the dimes place to represent the dime we just received in exchange.

$1000.00	$100.00	$ 10.00	$ 1.00		10¢	1¢
thousand dollar bill	hundred dollar bill	ten dollar bill	one dollar bill		dimes	pennies
4	3	5	6	•	① 2	5
3	6	4	1	•	5	5
						0

Ask another student to add the digits in the dimes place (1 + 2 + 5 = 8 dimes). Write the 8 in the dimes place. Continue adding in each place, renaming when necessary. Ask another student to write the addends on the chalkboard without the place value chart, only this time put the lower addend on top and the top addend on the bottom.

$$\begin{array}{r} \$3,641.55 \\ +\ 4,356.25 \\ \hline \end{array}$$

Ask a student to find the sum. Say, "Does it match the sum of the first example? (yes) Why?" (Because the order of the addends does not change the sum). Explain that we can use this to help us check addition.

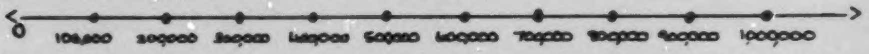
Repeat this procedure with other money amounts through six digits.

5.02.01.02 **estimate by rounding addends to the largest possible place**

STRATEGY 1: Present the following problem: "A fishing boat caught 235,260 fish last year. Another boat caught 461,295 fish. About how many fish did both

STRATEGY 1:
cont'd

boats catch?" Elicit from the students that it is much easier to count if we round the numbers first. Construct a number line numbered from 0 through 1,000,000 in multiples of 100,000 on the chalkboard.



Explain that in order to know which hundred thousand a number is closer to, we must know the midpoint between a pair of hundred thousands. Elicit from the students that 50,000 is the midpoint between 0 and 100,000; 150,000 is the midpoint between 100,000 and 200,000, ...

Ask a student to write the addends on the chalkboard.

$$\begin{array}{r} 235,260 \\ \underline{+461,295} \end{array}$$

Select a student to read the first addend, and then, using the number line, tell between which pair of hundred thousands it can be found (235,260 comes between 200,000 and 300,000). Explain that it comes before the midpoint of 250,000; therefore, it is closer to 200,000. Write the following on the chalkboard.

$$\begin{array}{rl} 235,260 & \text{rounds to } 200,000 \\ \underline{+461,295} & \end{array}$$

Repeat this procedure, estimating where 461,295 would be found on the number line (between 400,000 and 500,000). Elicit that it is closer to 500,000 because it is past the midpoint of 450,000. Write the following on the chalkboard.

$$\begin{array}{lr} 235,260 \text{ rounds to} & 200,000 \\ 461,295 \text{ rounds to} & \underline{+500,000} \\ & 700,000 \end{array}$$

Explain that adding the rounded numbers is easy and can be done mentally. Elicit that about 700,000 fish were caught by both boats.

Repeat this procedure for rounding and estimating numbers through six digits.

STRATEGY 2: Say, "A bus driver drove 238,514 miles last year. He drove 374,106 miles this year. Approximately how many miles did he travel in all?" Since we do not have to find the exact sum, elicit from the students that we can estimate the sum by rounding. Write the addends on the chalkboard.

238,514
+374,106

Say, "It will be easier to estimate if we round each addend to the nearest hundred thousand." Ask a student to circle the digit in the hundred thousands place in the first addend.

238,514
+374,106

Explain that (2) in the hundred thousands place tells us that this number is between 200,000 and the next hundred thousand which is 300,000. Direct another student to put a line under the number to the right of the circled digit (ten thousands place).

238,514
+374,106

Elicit that this digit represents 30,000. Say, "We don't have to go any further with the digits because we can see that 230,000 is closer to 200,000 than it is to 300,000 so we round it to 200,000." Write the following on the chalkboard.

238,514 rounds to 200,000
+374,106

Repeat this procedure with the second addend. Say, "Now that both addends have been rounded, we can estimate how many miles the bus driver traveled in all." Elicit from the students that the sum of the two rounded addends is 600,000; therefore, the bus driver drove about 600,000 miles in all.

Repeat this procedure with similar addends.

5.02.01.03 **solve word problems related to skills learned in this module**

STRATEGY 1: Say, "In Oakville the population is 235,639 people. The neighboring town has a population of 147,565 people. How can we find out how many people live in both towns?" Elicit from the students that addition is required to solve this problem. Say, "Do you think there will be more than 200,00 or less than 200,000 people?" (more) "Why?" Elicit from the students that the sum will be greater than either addend.

Prepare to estimate by rounding each addend to the nearest hundred thousand. Ask a student to write the addends on the chalkboard.

```
 235,639 rounds to
+147,565 rounds to
```

and to round each addend to the nearest hundred thousand, writing it on the chalkboard after the words "rounds to."

```
 235,639 rounds to  200,000
+147,565 rounds to +100,000
```

Ask a student to find the sum of the rounded addends and write it on the chalkboard. (300,000) Say, "Now that we know <u>about</u> how many people are in the two towns, let's go back to the exact numbers and find the real total." Ask the students to add the exact numbers from the problem. Select a student to write the sum on the chalkboard. (383,204) Ask the students to compare the real sum to the estimate.

As a check, ask a student to write the addends on the chalkboard, putting the bottom addend at the top and the top addend below it.

e.g.,

```
 147,565
+235,639
```

STRATEGY 1: cont'd

Direct the students to find the sum again. Say, "What do you notice about this sum and the previous sum?" (They are the same.) Inform students that this method is used to check addition.

Repeat this procedure using problems with numerals through six digits.

STRATEGY 2:

Say, "The building superintendent collected $435.50 rent from Mr. Cruz and $395.75 rent from Mrs. Barr. How much rent money did he collect all together?" Elicit from the students that addition is necessary to solve the problem because we are joining sets. Ask a student to write the addends on the chalkboard.

$$\begin{array}{rcr} \$435.50 & \text{rounds to} & \$400.00 \\ \underline{+\ 395.75} & \text{rounds to} & \underline{+\ 400.00} \end{array}$$

Then ask the students to estimate the sum. ($800.00) Next, instruct the students to add the exact addends to find the sum. ($831.25) Ask the students to compare the sum to the estimate. Say, "Were we very close?"

As a check of their addition, allow a student to write the example on the chalkboard again and solve it, this time putting the bottom addend on top and the top addend below.

$$\begin{array}{rl} \$395.75 & \\ \underline{+\ 435.50} & \\ \$831.25 & \text{rent} \end{array}$$

Elicit from the students that the sum is the same because changing the order of the addends in addition does not change the sum (commutative property).

Repeat this procedure using other money amounts through six digits.

P.O. 5.02.01.01

NAME: ______________________ CLASS: __________ DATE: ________

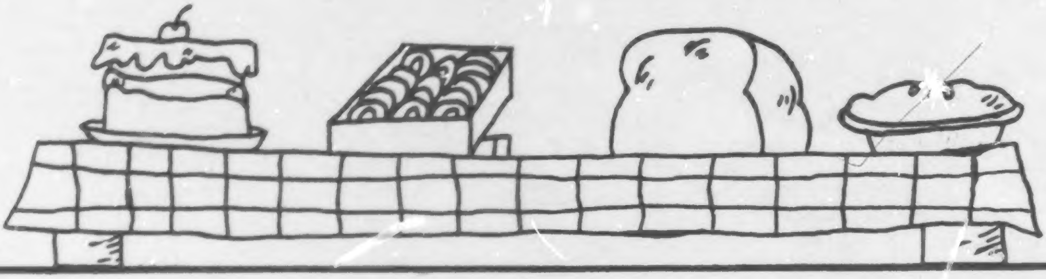
Directions: Solve and check each example.

ADD	CHECK	ADD	CHECK
4,348 +2,614	2,614 +4,348	347,293 +219,475	
2,645 +5,791		274,362 +159,008	
4,978 +4,266		764,013 +145,327	
15,325 +62,704		264,381 +225,490	
$28.46 + 14.95 $		$2643.27 + 1952.61 $	
$263.07 + 145.99 $		$7432.98 + 427.60 $	

P.O. 5.02.01.02

NAME: ______________________ CLASS: ________ DATE: ________

Directions: Follow the directions in each box.



Round each number to the nearest thousand.

6,234		7,584	
2,975		1,046	
1,796		4,489	

Round each number to the nearest ten thousand.

24,317		71,966	
19,455		55,418	
26,740		84,600	

Round each number to the nearest hundred thousand.

375,164		195,200	
631,208		586,314	
756,675		413,769	

P.O. 5.02.01.03

NAME:_____________________________________CLASS:________DATE:_______

Directions: Read each problem. Estimate the answer, solve and check in the labeled box below each problem.

The Parker Avenue School spent $354.80 for all the 5th grade children to go the the circus. Then the school spent $296.50 for the 5th grade children to go to the Planetarium. How much did the school spend in all?

Estimate	Solve	Check

On Monday 347,196 people rode the subway to New York City. On Tuesday 483,103 people rode the subway. How many people rode the subway on both days?

Estimate	Solve	Check

In one year the Smith family drove their car 27,684 kilometers. The following year they drove their car 15,293 kilometers. How far did they drive during the two years?

Estimate	Solve	Check

P.O. 5.02.01.03

NAME:________________ CLASS:________ DATE:________

Directions: Read each problem. Estimate the answer, solve, and check in the labeled boxes below each problem.

On Friday 236,483 people were at the circus. On Saturday 473,293 people were at the circus. How many people were there both days?

Estimate	Solve	Check

At the Burger Shack 46,725 hamburgers and 20,495 orders of french fries were sold. How many hamburgers and french fries were sold in all?

Estimate	Solve	Check

Last month $2,436.20 was spent at the County Fair. This month $1,879.65 was spent there. How much was spent there for both months?

Estimate	Solve	Check

5.14.03 SUBTRACTION

(ongoing)

PERFORMANCE OBJECTIVES

The student will be able to...

5.14.03.01 compute differences of 2- and 3-digit numbers without exchange;

e.g.,

$$\begin{array}{r} 87 \\ -42 \\ \hline 45 \end{array} \qquad \begin{array}{r} 865 \\ -234 \\ \hline 631 \end{array}$$

5.14.03.02 compute differences of 2- and 3-digit numbers with exchange.

e.g.,

$$\begin{array}{r} 63 \\ -25 \\ \hline 38 \end{array} \qquad \begin{array}{r} 752 \\ -114 \\ \hline 638 \end{array} \qquad \begin{array}{r} 832 \\ -289 \\ \hline 543 \end{array}$$

5.14.03

VOCABULARY

TERMS

minuend
difference

GETTING STARTED

Write the following examples on the chalkboard, e.g. 15-6=□ , 15-9=□ . Ask a student to come to the chalkboard and solve the examples. Say, "These are related subtraction facts. If you know one you will be able to figure out the other one." Continue this procedure using other related facts.

Make a "Guess My Rule" chart on the chalkboard.

e.g.,

□	△

Say, "Give me a number. I will write it on the chart under the □ . I am going to do something to the number and write the answer in the △ column."

e.g.

□	△
8	5
7	4
12	9

"Who can guess my rule?" Elicit from the students that you subtracted three from each number. Write on the chalkboard □ -3= △ . Ask students to fill in the box and triangle using the numbers in the table to check for accuracy.

Select students to make their own rules, and continue this procedure.

5.14.03

5.14.03.01 **compute differences of 2- and 3-digit numbers without exchange**

STRATEGY 1: Write the following example on the chalkboard.

$$\begin{array}{r} 87 \\ \underline{-42} \end{array}$$

Ask a student to read the two numbers aloud. Elicit from the students the number of ones in each number. Select a student to subtract the ones. Repeat this procedure for the tens. Say, "Our answer, which is called the difference, is 45." Continue this procedure for 3-digit numbers.

STRATEGY 2: Prepare and distribute squared material to each student. Write the following example on the chalkboard.

$$\begin{array}{r} 65 \\ \underline{-43} \end{array}$$

Ask the students to regroup 65. (6 tens + 5 ones)

Say, "Place 6 ten strips and 5 unit squares on your desks. " Elicit from the students the number of ones in 43. (3)

Say, "Take away 3 ones from the 5 ones on your desk. How many are left? (2) How many tens are in 43? (4) Take away 4 tens from the tens on your desk. How many are left?" (2) Write 22 under the example. Say, "22 is called the difference." Continue this procedure using other 2- and 3-digit numbers.

5.14.03

5.14.03.02 **compute differences of 2- and 3-digit numbers with exchange**

STRATEGY 1: Prepare and distribute squared material to each student. Write the following examples on the chalkboard.

$$\begin{array}{r} 63 \\ -\underline{25} \end{array} \qquad \begin{array}{r} 752 \\ -\underline{114} \end{array} \qquad \begin{array}{r} 832 \\ -\underline{289} \end{array}$$

Point to the first example. Elicit from the students the number of tens and ones in 63. Ask the students to place 6 tens and 3 ones on their desks using their squared material. Say, "Take away 5 ones." Elicit from the students that they cannot do this. They must exchange one ten for ten ones. Say,"Take away one of your tens. How many tens are left? (5) Now exchange the ten for 10 ones and place them with the 3 ones. How many ones do you have in all? (13) Now take away five. How many are left?" (8) Write this step on the chalkboard.

$$\begin{array}{r} 63 \\ -\underline{25} \\ 8 \end{array}$$

Say, "Take away 2 tens. How many are left? (3) What is our answer?" (38) Write this on the chalkboard.

$$\begin{array}{r} 63 \\ -\underline{25} \\ 38 \end{array}$$

Point to the second example. Ask the students how this is different from the example they just completed.

Elicit that it has three places.

Say, "We do this example the same way, only we have one more place in which we must subtract."

STRATEGY 1: cont'd

Point to the third example. Elicit from the students the number of hundreds, tens, and ones in 832. Ask the students to use their squared material to show 8 hundreds, 3 tens, and 2 ones. Say, "Take away 9 ones." Elicit from the students that they must exchange 1 ten for 10 ones. Say, "Do this and tell us the number of tens left. (2)... the number of ones. (12) Now take away 9 ones. How many are left?" (3) Write this step on the chalkboard.

$$\begin{array}{r} 832 \\ \underline{-289} \\ 3 \end{array}$$

Say, "Take away 8 tens." Elicit from the students that they cannot do this. Say, "We must take one hundred and exchange it for 10 tens. Make this exchange using your material. How many hundreds are left? (7) How many tens do we have now? (12) Take away 8. How many are left?" (4) Show this on the chalkboard.

$$\begin{array}{r} 832 \\ \underline{-289} \\ 43 \end{array}$$

Say, "Now take away 2 hundreds. How many are left?" Complete the example on the chalkboard.

$$\begin{array}{r} 832 \\ \underline{-289} \\ 543 \end{array}$$

Ask the students to look at the example on the chalkboard so that they can see how to represent the exchange. Emphasize the steps - first the ones, then the tens, then the hundreds. Continue this procedure with other numbers.

STRATEGY 2 Write the following examples on the chalkboard.

$$\begin{array}{r} 63 \\ -\underline{25} \end{array} \qquad \begin{array}{r} 832 \\ -\underline{289} \end{array}$$

Say, "How many ones are in 63? (3) Take away 5." Elicit from the students that this cannot be done. Say, "We must exchange 1 ten for 10 ones. We add the 10 ones to the ones we already have." Show this step on the chalkboard.

$$\begin{array}{r} 63 \\ \underline{-25} \\ 8 \end{array}$$

Ask a student to complete the example. Point to the second example. Say, "How many ones in 832?" (2) "Take away 9." Elicit from the students that in order to do this we must exchange 1 ten for 10 ones.

Ask a student to subtract the ones column. (3) Write the 3 in the example.

$$\begin{array}{r} 832 \\ -\underline{289} \\ 3 \end{array}$$

Say, "Can we take away 8 tens?" Elicit from the students that we must exchange one hundred for 10 tens. Show this representation on the chalkboard.

$$\begin{array}{r} 832 \\ -\underline{289} \\ 3 \end{array}$$

Say, "How many hundreds do we have now? (7) How many tens?" (12) Ask a student to subtract in the tens column. Select another student to complete the example.

Continue this procedure using other 2- and 3-digit numbers.

P.O. 5.14.03.01

NAME: ______________________ CLASS: ________ DATE: ________

Directions: Subtract. Use the key to solve the riddle.

What Is A Ghost's Favorite Food ?

Key	B	E	G	L	M	O	U
	211	111	444	24	40	41	343

(a) 526 -315 211	(b) 224 -113	(c) 987 -543
(d) 68 -44	(e) 90 -50	(f) 987 -946
(g) 876 -665	(h) 569 -226	(i) 451 -410

B					
a	f	i	g	d	b

c	h	e

P.O. 5.14.03.02

NAME: ______________________ CLASS: __________ DATE: ______

Directions: Subtract. Use the key to solve the riddle.

What do bulls eat?

Key	B	E	L	N	O	U	Y
	181	48	287	19	628	379	29

a. 605 -424 181	b. 84 -36	c. 422 -135
d. 38 -19	e. 854 -226	f. 823 -444
g. 52 -23	h. 409 -122	i. 837 -550

B	___	___	___	-	___	___	___	___	___
a	f	c	h		i	e	d	b	g

Unit 8

5.03.01 SUBTRACTION THROUGH 6-DIGIT NUMBERS

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.03.01.01A subtract a 6-digit number from a 6-digit number with regrouping in any column and check;
e.g.,

$$\begin{array}{r} 79\overset{3}{\cancel{4}},046 \\ \underline{-433,125} \\ 360,921 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ 433,125 \\ \underline{+360,921} \\ 794,046 \end{array}$$

5.03.01.02B estimate differences by rounding minuends and subtrahends (less than 1 million) to the nearest 100,000;
e.g.,

$$\begin{array}{lr} \text{to the nearest hundred thousand 294,246 rounds to} & 300,000 \\ \text{to the neareast hundred thousand 183,125 rounds to} & \underline{-200,000} \\ & 100,000 \end{array}$$

5.03.01.03B solve word problems related to skills learned in this module.
e.g.,

There were 214,632 people living in Hawley. 111,241 moved away. How many people were left in Hawley?

$$\begin{array}{r} \underline{\text{compute}} \\ 214,632 \\ \underline{-111,241} \\ 103,391 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ 103,391 \\ \underline{+111,241} \\ 214,632 \end{array}$$

5.03.01

VOCABULARY

TERMS

minuend
subtrahend

GETTING STARTED

Prepare base ten materials. Place on the chalkboard ledge, 4 thousand cubes, 2 hundred squares, 6 ten strips, and 5 units. Ask a student to take away 2,753. Write 4,265
-2,753
on the chalkboard. Ask a student to subtract in the ones and tens place using the material.

Say, "What must be done so that I can take away 7 hundreds from 2 hundreds?" Elicit that one thousand must be regrouped as 10 hundreds. Say, "How many hundreds do I have now? (12) I need to take 7 away. Please hand me seven. How many hundreds are left?" Ask a student to subtract in the thousands place.
Say, "How many bundles of ten sticks?"

Repeat this procedure using other numbers.

Distribute squared materials to each student (thousands, hundreds, tens, and ones). Write the following example on the chalkboard.

$$\begin{array}{r} 9854 \\ -\underline{6428} \end{array}$$

Ask the students to show 9 thousands, 8 hundreds, 5 tens, and 4 ones.

Say, "Take away 8 ones." Elicit that this cannot be done. Say, "Is there anything that can be done to get enough ones?" Elicit the exchange of one bar of 10 for 10 ones. Record the following on the chalkboard.

$$\begin{array}{r} 9854 \\ -\underline{6428} \end{array}$$

Say, "Can the subtraction be completed now?" Ask a student to finish the example. Repeat this procedure with an exchange of thousands for hundreds and hundreds for tens.

5.03.01

5.03.01.01 **subtract a 6-digit number from a 6-digit number with regrouping in any column and check**

STRATEGY 1: Draw a place value chart on the chalkboard through hundred thousands. Write a 6-digit number on the chart.

H.Th.	T.Th.	Th.	H.	T.	O.
5	8	6	7	4	1

Select a student to write this number in expanded form, e.g.,500,000 + 80,000 + 6,000 + 700 + 40 + 1. Write another number in the place value chart, e.g., 569,831. Ask a student to write this number in expanded form under the first expanded number.

```
 500,000 + 80,000 + 6,000 + 700 + 40 + 1
-500,000 + 60,000 + 9,000 + 800 + 30 + 1
```

Place a subtraction symbol to the left of the second expanded number. Say, "First subtract the numbers in the ones column and the tens column. What must we do to subtract in the hundreds column? (regroup) We regroup one thousand for 10 hundreds." Show this in the example. Complete the subtraction in the hundreds column. Say, "Can we subtract in the thousands column? What must we do?" Elicit from the students that we must regroup 1 ten thousand for 10 thousands. Show the regrouping in the example. Ask the students to complete the example. Say, "Let us do the same example in standard form. Write the following example on the chalkboard.

```
 586,741
-569,831
```

Ask a student to come to the chalkboard, do the example, and show the regrouping from thousands to hundreds and ten thousands to thousands. Say, "To

STRATEGY 1: cont'd

check our work we add the subtrahend and the difference. If the total is equal to the minuend, we know we are right." e.g.,

$$\begin{array}{r} 586,741 \\ -569,831 \\ \hline 16,910 \end{array} \qquad \begin{array}{r} 569,831 \\ +\ 16,910 \\ \hline 586,741 \end{array}$$

STRATEGY 2:

Prepare play money through hundred thousand dollars, and place value cards through hundred thousands. Have a large desk or table in front of the classroom. On the table have place value cards.

Hundred Thousand	Ten Thousand	Thousand	Hundreds	Tens	Ones

Ask a student to come up and show the number 453,753 on the place value chart using the play money.

400,000 50,000 3,000 700 50 3

Write the following example on the chalkboard.

$$\begin{array}{r} 453,753 \\ -131,921 \\ \hline \end{array}$$

Say, "We have already represented the number 453,753 in our place value chart with play money. We want to take away 131,921. We start in the ones column on the chart and take away 1 from 3 and have 2 left. Write 2 in the ones place. Next go to the tens column in our place value chart and take 2 away from 5 and have 3 left. Write 3 in the tens place. Now, in the hundreds column on our chart we have seven hundreds, but we cannot take away nine hundreds. What should we do?" Elicit from the students that we must take one of the thousands and exchange it for 10 hundreds. Place the 10 hundreds in the hundreds column to make 17 hundreds. Say, "We now have 17 hundreds and we can take away 9 hundreds, which leaves 8 hundreds."

STRATEGY 2: cont'd

Write 8 in the hundreds place. Proceed to the thousand column on the chart that now has 2 thousands and continue to subtract, using the chart as an aid. When completed, both the chart and the algorithm appear as below.

Hundred Thousand	Ten Thousand	Thousand	Hundreds	Tens	Ones
3	2	1	8	3	2

$$\begin{array}{r} 453{,}753 \\ -131{,}921 \\ \hline 321{,}832 \end{array} \quad \xleftrightarrow{\text{Same}} \quad \begin{array}{r} \underline{\text{check}} \\ 131{,}921 \\ +321{,}832 \\ \hline 453{,}753 \end{array}$$

Say, "To check, add the subtrahend and the difference. The total is the same as the minuend; therefore, we know we are correct."

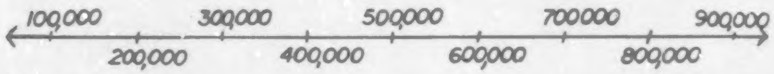
5.03.01.02 **estimate differences by rounding minuends and subtrahends (less than 1 million) to the nearest 100,000**

STRATEGY 1: Prepare a pack of cards with 6-digit numbers written on them. Say, "When we round a 6-digit number, e.g., 378,453, to the nearest hundred thousand, it is important to look at the number in the ten-thousand place. If the number is 5 or more we round up. If it is less than 5 we round down. Let's play a game." Divide the class into two teams (Blue and Red). Select a player from each team. Say, "You will be shown a number which must be rounded to the nearest hundred-thousand, e.g., 412,842. Whichever player says, '400,000' wins the round. Show the class several cards and the team with the most cards wins. Say, "Let's estimate the difference between 711,419 and 297,173 by rounding." Write the following on the chalkboard.

STRATEGY 1: 711,419 rounds to 700,000 700,000
cont'd 297,173 rounds to 300,000 -300,000

Select a student to subtract. Say "Our estimate is 400,000".

STRATEGY 2: Draw a number line on the chalkboard with colored chalk numbered from 100,000 through 900,000.



Say, "In our number line we are counting by 100,000. We are going to round numbers to the nearest hundred thousand. When rounding to the nearest hundred thousand, our key is the ten thousand column. If the number in the ten thousand column is 5 or greater what do we do? (Round up) If the number is less than 5?" (Round down)

Write a number on the chalkboard, e.g., 773,811. Ask a student to point to the place on the number line where he/she thinks the number would fall. Place an X on the line between 700,000 and 800,000 and write the number above the X, as below.

773,811
700,000 X 800,000

Say, "Which number is 773,811 closer to, 700,000 or 800,000? (800,000). Why?" Elicit that in the number 773,811, the digit in the ten thousand place is more than 5, so we round up to 800,000.

Say, "We round to help us subtract by estimating. Remember that an estimate is an approximate not an exact answer." Write the following on the chalkboard.

$$\begin{array}{r} 887,423 \\ \underline{-209,211} \end{array}$$

Select two students to come up and round these numbers to the nearest hundred thousand.

5.03.01

STRATEGY 2: cont'd

$$\begin{array}{rcr} 887,423 & \text{rounds to} & 900,000 \\ \underline{-209,211} & \text{rounds to} & \underline{+200,000} \end{array}$$

Select another student to come to the chalkboard and subtract the rounded example.

$$\begin{array}{r} 900,000 \\ \underline{-200,000} \\ 700,000 \end{array}$$

Continue this procedure using other numbers.

5.03.01.03 **solve word problems related to skills learned in this module**

STRATEGY 1: Write the following on the chalkboard.

In a certain town there are 439,216 people, of which 211,316 are males. How many females are there in this town?

Say, "Before we find the actual answer we will estimate our result." Ask a student to come to the chalkboard and estimate.

439,216 rounds to 400,000
211,316 rounds to 200,000

Say, "To find the number of females, what must we do?" Elicit that we must subtract the number of males from the total population. Ask another student to come to the chalkboard and perform the subtraction using the estimated numbers.

$$\begin{array}{r} 400,000 \\ \underline{-200,000} \\ 200,000 \end{array}$$

Say, "Now that we have estimated that there are approximately 200,000 females in the town, let us find the exact number." Ask another student to come to the

STRATEGY 1: cont'd

chalkboard and perform the subtraction.

$$\begin{array}{r l} 439{,}216 & \text{Total} \\ -211{,}316 & \text{Males} \\ \hline 227{,}900 & \text{Females} \end{array}$$

Say, "We now want to find out if our answer is correct. How do we do this?" Elicit from the students that we check by addition. Ask a student to come to the chalkboard and perform the check.

$$\begin{array}{l r c r l} \text{People} & 439{,}216 & & 211{,}316 & \text{Males} \\ \text{Males} & -211{,}316 & \text{Same} & +227{,}900 & \text{Females} \\ \cline{2-2}\cline{4-4} \text{Females} & 227{,}900 & \dashrightarrow & 439{,}216 & \text{People} \end{array}$$

Say, "Since the total number of people in both computations is the same, we performed our subtraction correctly."

STRATEGY 2: Write the following on the chalkboard.

Joe saved $8,596.67. He purchased a car for $6,825.32. How much money does he have left?

Ask a student to come to the chalkboard and solve the problem. Ask the following questions:

1. What are you given?
2. What do you have to find?
3. What must you do in order to get the answer?

Elicit the answers to the above questions from the student. Ask the student to perform the subtraction in order to arrive at the answer.

$$\begin{array}{r} \overset{7}{\cancel{8}},\overset{15}{\cancel{5}}96.67 \\ -6{,}825.32 \\ \hline 1{,}771.35 \end{array}$$

Say, "Could we have found the approximate answer by estimating?" Select a student to show the estimated answer on the chalkboard.

$$\begin{array}{r c r} 8{,}596.67 & \longrightarrow & 9{,}000.00 \\ -6{,}825.32 & \longrightarrow & -7{,}000.00 \\ \hline 1{,}771.35 & \longrightarrow & 2{,}000.00 \end{array}$$

STRATEGY 2: cont'd

Ask another student to come to the chalkboard and verify if the above computations are correct. Ask the student how he/she can do this. Elicit that we check by addition.

Have a student perform the addition on the chalkboard.

$$\begin{array}{r} 6{,}825.32 \\ +1{,}771.35 \\ \hline 8{,}596.67 \end{array}$$

Write the following on the chalkboard.

$$\begin{array}{r} 8{,}596.67 \\ -6{,}825.32 \\ \hline 1{,}771.35 \end{array} \quad \xleftrightarrow{\text{Same}} \quad \begin{array}{r} 6{,}825.32 \\ +1{,}771.35 \\ \hline 8{,}596.67 \end{array}$$

Say, "Since Joe had $8,596.67 to begin with and he spent $6,825.32 for a car, he had $1,771.35 left. We checked this by adding $1,771.35 to $6,825.32 and we arrived at the original amount.

P.O. 5.03.01.01

NAME: ______________________ CLASS: __________ DATE: ________

Directions: Regroup where necessary and subtract.

852,731 -113,421	755,849 -460,738
591,884 -134,730	398,245 -176,934
702,530 -380.261	865,767 -535,484
560,437 -248,213	837,984 -527,693
957,034 -635,612	748,291 -316,750
885,472 -343,731	866,375 -484,254
648,968 -319,584	241,865 -118,423
299,368 -184,863	773,414 -491,302
774,843 -415,313	585,374 -122,196

74

P.O. 5.03.01.02

NAME:____________________ CLASS:________ DATE:________

Directions: Round each number and subtract.

534,265 -211,375 500,000 - 200,000 300,000	544,397 -118,257
878,156 -543,275	443,792 -142,439
776,352 -343,295	900,637 -881,751
632,765 -118,463	551,724 -259,934
492,987 -134,986	374,857 -191,253
192,376 -134,757	450,445 -210,843
886,275 -434,389	766,813 -312,245
519,275 -111,432	845,375 -281,434
464,105 -223,275	335,415 -192,165

P.O. 5.03.01.03

NAME: ______________________ CLASS: ________ DATE: ________

Directions: Solve and check.

1. Rosa purchased a car for $5,138.25. She had $8,943.84 saved up. How much money did she have left?

Estimate	Compute	Check
$ 9,000.00	$ 8,943.84	$ 5,138.25
- 5,000.00	-5,138.25	+ 3,805.59
$ 4,000.00	$ 3,805.59	$ 8,943.84

2. If the moon is about 235,000 miles from earth and a spaceship is 10,000 miles away from earth, how far is the spaceship form the moon?

3. If it costs $2,873.34 to go to California and $1,564.31 to go to Houston, how much will you save by going to Houston?

4. Our house needs repairs. It is estimated that repairs will cost $3,475.27. If we have $2,134.64 saved up, how much money will we have left after completing repairs?

5. A questionnaire was sent to 912,473 people. Only 594,365 people sent it back. How many people did not answer the questionnaire?

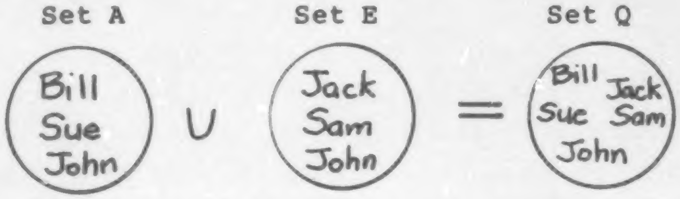
5.13.01 SETS

(1-2 lessons)

PERFORMANCE OBJECTIVES

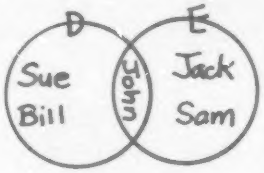
The student will be able to...

5.13.01.01A identify the set which is the union of two finite sets using Venn diagrams; e.g.,


Set A
Set E
Set Q
Bill
Sue
John
U
Jack
Sam
John
=
Bill
Jack
Sue
Sam
John

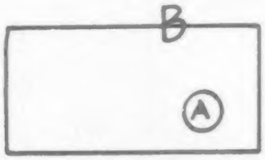
A U E = (Bill, Sue, John, Jack and Sam)

5.13.01.02A identify the set which is the intersection of the two finite sets using Venn diagrams; e.g.,


D
E
Sue
Bill
John
Jack
Sam

D ∩ E = (John)

5.13.01.03A use a Venn diagram to show that the members of subset A are also members of the universal set B. e.g.,



VOCABULARY

TERMS

union
intersection
finite
sets
elements
subset
Venn Diagram
empty set
disjoints

GETTING STARTED

Put several objects in a box, e.g., ruler, chalk, marble, eraser... Have three plastic see-through cups on a table labeled A, B, and C. Ask a student to select three items and put them in the cup marked A. Say, "The items in the cup will make up a set, the collection of things in the cup. Each of the items in the cup are called the elements or members of the set A." Ask another student to come up and select three other items from the box and place them in the cup marked B. Say, "This will be Set B and the items in the cup are the elements or members of Set B." Write the following on the chalkboard.

Set A = {ruler, chalk, marble}
Set B = {eraser, book, gum}

Say, "Are there any members in Set A that are also in Set B?" (No) "We call these sets that have no members in common, separate or disjoint sets."

Place the third cup on the table marked C. Say, "This cup has no members or items in it. We call Set C the empty set."

Ask three boys in the class to step to one side of the room. These boys will make up Set A, a collection of people. Give one boy a

GETTING STARTED - cont'd

card labeled A, indicating the boys will be called Set A. Say, "The boys who make up this set are the members or elements of the set." Select three girls to step to the other side of the room. These girls will form a set. Give one girl a card labeled B, indicating that they will be called Set B. Say, "The girls who make up this set are the members or elements of Set B." Write the following on the chalkboard.

Set A = {John, Frank, Bill}

Set B = {Fran, Ann, Maria}

Say, "Are there any members in Set A that are also in Set B? (No) We call these sets that have no members in common, separate or disjoint sets."

Mark a third card C. Say, "This is Set C, which consists of the grandmothers in the class. Since there are no grandmothers in the class, the set has no members. We call Set C the empty set."

5.13.01

5.13.01.01 identify the set which is the union of two finite sets using Venn diagrams

STRATEGY 1: Ask 6 students to come to the front of the room. Call three of them set A and the next three set B.

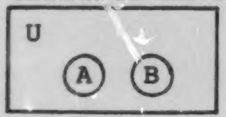
e.g., set A = {Jan, Sue, Alice}
set B = {Bob, Jack, Bill}

Say, "When we join these two sets, we get a third set called set C."

Set C = {Jan, Sue, Alice, Bob, Jack, Bill}
We call the joining of sets, the union of set A and set B. The symbol U stands for union, e.g., AUB = {Jan, Sue, Alice, Bob, Jack, Bill.}

Draw a Venn diagram on the chalkboard. Explain that this diagram is called a Venn diagram. The rectangle is the Universal set or the set of all the children in the class.

Children in class



Ask the students who live one block from school to come to the front of the room. Then ask the students who ride to school to come to the front of the room. Make a Venn diagram showing the two sets. Describe the universal set and the two sets. Write AUB. Say, "A union B."

Continue with other sets using students in the class.

e.g., students that have two pencils, students that have no pencils, students that have red clothing, students that have yellow clothing...

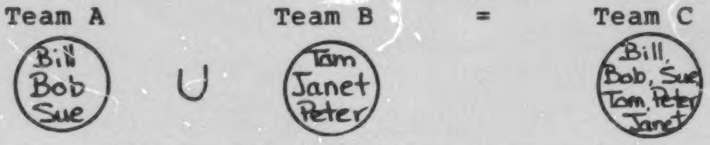
Make Venn diagrams to illustrate the union of two finite sets.

5.13.01

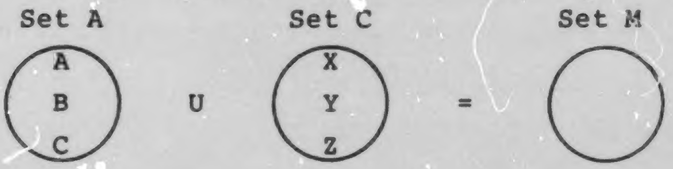
STRATEGY 2: Ask three students to come to the front of the room. Call them Team A. Ask three other students to walk to the front of the room. Call them Team B. Write their names on the chalkboard.
e.g.,

Team A
Bill
Bob
Sue
Team B
Tom
Janet
Peter

Explain that you want to make a new team using the students from Team A and the students from Team B. Say, "We will call the new team Team C." Ask the students of both groups to join together to make Team C. Write the following on the chalkboard.


Team A
Bill
Bob
Sue
U
Team B
Tom
Janet
Peter
=
Team C
Bill, Bob, Sue, Tom, Peter, Janet

Discuss with the students that Team C is the union of Team A and Team B, and that all six students became part of Team C. We write this as A∪B = C
Write the following on the chalkboard.


Set A
A
B
C
U
Set C
X
Y
Z
=
Set M

Ask a student to write the members of Set M in the Set M circle (A,B,C,X,Y,Z).

Repeat this procedure with similar problems.

5.13.01.02 **identify the set which is the intersection of the two finite sets using Venn diagrams**

STRATEGY 1: Relate the following story.

Mrs. Green had two sons. She asked each of

STRATEGY 1: cont'd

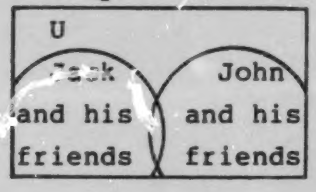
them to write down the names of five friends, as she had ten extra tickets to a ballgame. Only eight friends showed up. What happened to the other two friends? Mrs. Green asked to see her sons' lists. All of John's friends came. All of Jack's friends came.

Write the list on the chalkboard and ask what happened.

Jack's list	John's list
Joe	Larry
Bill	Joe
Bob	Juan
Harry	Harry
Jose	Sam

Say, "We can make a diagram to show what happened." Draw the diagram on the chalkboard.

People who came



Use two different colors of chalk to illustrate. Shade in the intersection.

Say, "The two circles overlap because two of John's friends are also Jack's friends."

Enter the children's names in the diagram.

Bill	Joe	Larry
Bob	Harry	Juan
Jose		Sam

Say, "We call the two overlapping names the intersection of the two sets."

STRATEGY 2: Ask the students to make a set of all the letters in their first and last name. Join the two sets. Say, "Do they overlap? Do they have members in common?"

STRATEGY 2: cont'd

e.g., John Brown

Set A = John

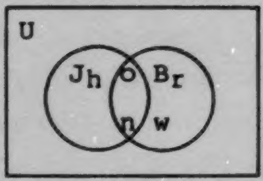
Set B = Brown

$A \cup B$ = John Brw

$A \cap B$ = o n

Explain to the students that $\cap$ is the sign for intersection. Make a Venn diagram to show the names.

John's Name



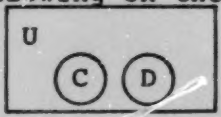
5.13.01.03 use a Venn diagram to show that members of subset A are also members of the universal set B

STRATEGY 1: Display different books on your desk. Hold up a mathematics book. Say, "What is this? It is also a member of a set of books on my desk. What else could it be a member of? It could be a part of a set of books in the room, or a set of books in the library." Elicit from the students that everything is a subset of a larger set. The larger set is the universal set written U. Ask a student in the class (a girl) to come to the front of the room. Explain to the students that the girl is part of the set of girls in this class and in the school and in the world. Continue with words on flashcards, e.g., chair, train, Decatur Street, P.S. 45. Say, "What universal sets are these part of?" Play a subset game. Say, "What is the universal set for triangle, hammer, zebra...?"

STRATEGY 2: Ask three students who live on one street and three children who live on another street to come to the front of the room. Explain to the students that the universal set is all of the students in the class, e.g., class 5.

U = children in class 5
set C = Sue, Ann, Jack - live on block A
set D = Jan, Jose, Juan - live on block B

Say, "We can make a Venn diagram to illustrate the union of these two sets. The rectangle is the universal set and the circles within the rectangle are subsets of the universal set." Illustrate the following on the chalkboard.



Make other subsets from the following universal sets.

Baseball players - American League - National League.

Automobiles - Foreign - American.

Streets in our district.

Children in our class

Teachers in our school.

Natural numbers.

P.O. 5.13.01.01

NAME: ______________________ CLASS: ________ DATE: _______

Directions: Join the two sets. What are the elements of the new set? Hint: Do not repeat any members. Put members in number order.

SET A = {1, 3, 5, 7, 9}

SET B = {3, 6, 9, 12}

SET C = {1, 3, 5, 6, 7, 9, 12}

1, 3, ~~3~~, 5, 6, 7, 9, ~~9~~, 12

SET A = {12, 4, 6, 8, 10}

SET B = {3, 6, 9, 12, 15}

SET C =

SET A = {a, b, e, f, g}

SET B = {e, g, m, a, c}

SET C =

SET A = {carole}

SET B = {charles}

SET C =

SET A = {fraction}

SET B = {finte}

SET C =

SET A = {3, 6, 9, 12, 15}

SET B = {6, 18, 24, 12}

SET C =

SET A = {diagrm}

SET B = {diamon}

SET C =

P.O. 5.13.01.02

NAME: ______________________________ CLASS: __________ DATE: ________

Directions: Join the two sets. What are the elements of the intersection. Draw a Venn diagram.

SET A = {CANDY} SET B = {CANE} $A \cup B =$ $A \cap B =$	SET A = {PURPLE} SET B = {PLUM} $A \cup B =$ $A \cap B =$
SET A = {3, 6, 9, 12, 15} SET B = {2, 4, 6, 8, 10, 12} $A \cup B =$ $A \cap B =$	SET A = {GOLDEN} SET B = {GLOBE} $A \cup B =$ $A \cap B =$
SET A = {GERMAN} SET B = {FRENCH} $A \cup B =$ $A \cap B =$	SET A = {1, 3, 5, 7, 9} SET B = {3, 6, 9, 12} $A \cup B =$ $A \cap B =$
SET A = {CHICKEN} SET B = {STICK} $A \cup B =$ $A \cap B =$	SET A = {LEMON} SET B = {LIME} $A \cup B =$ $A \cap B =$

P.O. 5.13.01.03

NAME:______________________________CLASS:________DATE:_______

Directions: Make 2 subsets, with 3 or more elements in each subset, from each universal set.

U = things we can drink.	U = things that have wheels.
U = multiples of 3.	U = prime numbers.
U = all odd numbers.	U= things that can move by themselves.
U = multiples of 4.	U= things that are round.

5.14.04 FRACTIONS

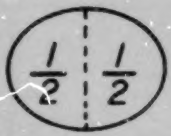
(ongoing)

PERFORMANCE OBJECTIVES

The student will be able to...

5.14.04.01 identify and write notation for $\frac{1}{2}$, $\frac{1}{4}$ and $\frac{1}{8}$ of a whole;

e.g.,



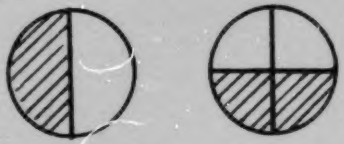
5.14.04.02 identify and define the numerator and denominator in a given fraction;

e.g.,

$\frac{2}{5}$ numerator
denominator

5.14.04.03 name equivalent fractions when given pictures of divided regions;

e.g.,



$\frac{1}{2}$ has the same value as $\frac{2}{4}$

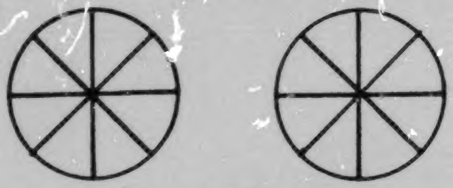
5.14.04.04 identify improper fractions and mixed numbers;

e.g.,

$\frac{6}{3}$ improper fraction $1\frac{1}{8}$ mixed number

5.14.04.05 divide one or more objects into fractional parts;

e.g.,



There are $\frac{16}{8}$ in two wholes.

5.14.04.06 add and subtract fractions ($\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$).

e.g.,

$$\frac{1}{2} + \frac{1}{2} = \frac{2}{2} = 1 \qquad \frac{5}{8} - \frac{2}{8} = \frac{3}{8}$$

$$\frac{5}{4} + \frac{2}{4} = \frac{7}{4} = 1\frac{3}{4} \qquad \frac{4}{4} - \frac{1}{4} = \frac{3}{4}$$

5.14.04

VOCABULARY

numerator
denominator

GETTING STARTED

Say, "What are the parts of a book?"

Elicit that the parts of a book are: the cover, the pages, the table of contents, the glossary, ...

Explain that for a complete book we must have all the parts. Say, "When we have all of the parts, we have a whole." Repeat this with the parts of a clock, typewriter, ...

Tell the students a short story. Be sure that the story has a beginning, a middle, and an end. Ask the students what happened at the beginning, the middle, and the end of the story. Explain that without any part, e.g., the end, the story would not be complete.

Say, "To be a whole story, a story must have all its parts."

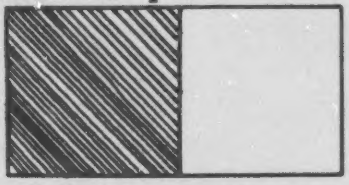
Repeat this, using other stories or simple rhymes. Stress that to be a whole it must have all its parts.

5.14.04

5.14.04.01 identify and write notation for $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$ of a whole

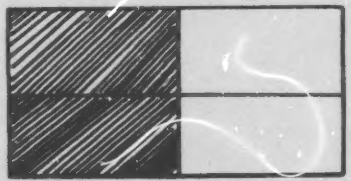
STRATEGY 1: Prepare different colored squares (about 4" x 4") for each student. Distribute the squares. Draw a large square on the chalkboard and divide it in half and shade one part.

e.g.,



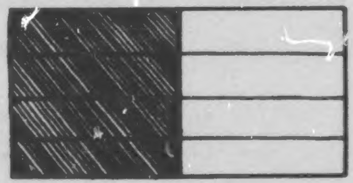
Ask the students to do the same. Say, "How many parts are shaded? What can I call the shaded piece?" ($\frac{1}{2}$) Select a student to come to the chalkboard and write $\frac{1}{2}$. Ask the students to fold their squares in half again. Divide the square on the chalkboard into four parts.

e.g.,



Say, "How many parts are in the square? (4) How many are shaded? (2) What is one part called? ($\frac{1}{4}$) What part of the whole is shaded?" ($\frac{2}{4}$) Ask a student to come to the chalkboard and write $\frac{2}{4}$. Ask the students to fold their squares in half again. Do the same at the chalkboard.

e.g.,



Say, "How many equal pieces are shaded? (4) What can we call each piece? ($\frac{1}{8}$) What part of the whole is shaded?" ($\frac{4}{8}$) Ask a student to come to the chalkboard and write $\frac{4}{8}$. Continue this procedure.

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5.14.04

STRATEGY 2: Hold up a large piece of paper. Say "This is one whole." Fold the paper in half. Ask the students to identify what each part of the sheet is called. ($\frac{1}{2}$) Write $\frac{1}{2}$ on the chalkboard. Fold the sheet in half again. Ask the students to identify what each part of the sheet is called. ($\frac{1}{4}$) Write $\frac{1}{4}$ on the chalkboard. Fold the sheet in half again. Ask the student to identify the number of parts (8) and the name of each part. ($\frac{1}{8}$) Write $\frac{1}{8}$ on the chalkboard.

5.14.04.02 **identify and define the numerator and denominator in a given fraction**

STRATEGY 1: Make a display chart of a pie on a flannel board. e.g.,

Ask "How would we divide this pie into four equal pieces?" Using the flannel board show how the pie can be cut into four equal parts. e.g.,

Say, "If there are four equal pieces, each piece is $\frac{1}{4}$ of the whole." Distribute the pieces to four students and elicit that each piece is one part of the whole.

STRATEGY 1: cont'd

Write 1 on the chalkboard. Write 4 under the 1 to form $\frac{1}{4}$. Say, "Each piece is $\frac{1}{4}$ of the total number of pieces. The bottom number shows us the total number of parts of the whole. This is called the denominator. The denominator of our pie is 4, because we cut the total pie into four parts. I gave you one part of the whole so we put a 1 on the top. This is called the numerator."

Write $\begin{matrix}1 & \text{numerator}\\ 4 & \text{denominator}\end{matrix}$ on the chalkboard and say, "The numerator tells us how many pieces we are using."

Repeat this procedure using various fractions.

STRATEGY 2:

Draw a pizza on oaktag. Cut the pizza into eighths. Say "We just had a pizza delivered. Who will take a piece?" Give out the pieces in the following way: give three students one piece each, one student two pieces, and one student three pieces.

Put an 8 on the chalkboard. Say, "This 8 tells us the total number of pieces in the pizza. Who got one piece of pizza?" Three students will raise their hands. Write their names on the chalkboard. Under each name write $\frac{1}{8}$.

e.g.,

Jim	Ron	Sue
$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

Say "We put a 1 on top because you only had one part of the eight. Who had two slices?" One student will raise his/her hand. Put his/her name on the chalkboard, and under it write $\frac{2}{8}$.

e.g.,

Dave
$\frac{2}{8}$

5.14.04

STRATEGY 2: cont'd

Say, "We put a 2 on the top for Dave because he had two parts of the eight." Repeat for three slices. Say, "We have special names for the top and bottom number of a fraction. The top number is called the numerator, the bottom number is called the denominator." On the chalkboard, write $\frac{\text{numerator}}{\text{denominator}}$.

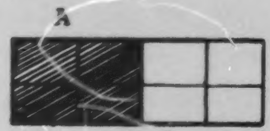
Repeat this procedure with various fractions.

5.14.04.03 **name equivalent fractions when given pictures of divided regions**

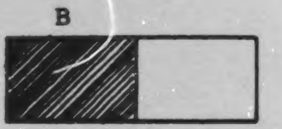
STRATEGY 1: Prepare a flannel board. Make doubles of several shapes cut in fourths, halves, and eighths. Shade some parts of each.

Put two shapes on the flannel board.

A



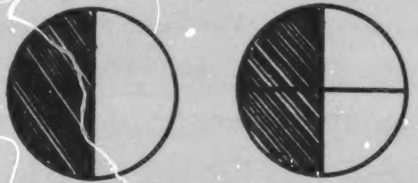
B



Ask a student what fraction is shaded in drawing A ($\frac{4}{8}$) and in drawing B ($\frac{1}{2}$). Say "They look so different, but something about them is alike." Ask a student to come to the flannel board and move the four shaded pieces of A and place them on top of B. Elicit that they fit perfectly and therefore are the same. Say "$\frac{4}{8} = \frac{1}{2}$." Repeat this procedure.

STRATEGY 2: Prepare circular puzzles cut into halves, fourths, eighths, fifths, and tenths. Shade equivalent pieces, e.g. ($\frac{1}{5}$, $\frac{2}{10}$), ($\frac{4}{8}$, $\frac{1}{2}$), ($\frac{2}{4}$, $\frac{1}{2}$). Put both sets in one envelope, e.g., halves and fourths.

STRATEGY 2: cont'd Distribute one envelope to each student. Ask the students to put the pieces together like a puzzle. e.g.,



Ask the students to identify the fractional parts, e.g., fourths, halves. Say "How many parts in each puzzle are shaded? (1 part in the halves) (2 parts in the fourths) Are the shaded parts equal?" Ask students to move the shaded area from one circle and put it on top of the shaded parts of the other circle. Elicit from the students that the shaded parts are equal. Say, "Therefore, we know that $\frac{1}{2}$ has the same value as $\frac{2}{4}$."

Ask students to place the pieces back into their envelopes and switch envelopes with other students to find other equivalent fractions.

5.14.04.04 **identify improper fractions and mixed numbers**

STRATEGY 1: Draw a circle divided in half, and half of another circle on the chalkboard. Say, "How many circles are there? (One and a half) How many half-circles?" (3)

Write the following on the chalkboard.

$\frac{3}{2}$ = 1 whole + $\frac{1}{2}$ of a whole

$\frac{3}{2} = 1\frac{1}{2}$

Explain to the students that a fraction such as $\frac{3}{2}$, where the top number (the numerator) is larger than

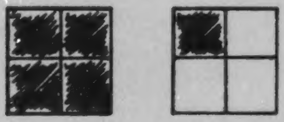
STRATEGY 1: cont'd

the bottom number (the denominator) is called an improper fraction. Reinforce the understanding that a proper fraction exists when the numerator is smaller than the denominator.

Now explain to the students that a whole number and a fraction together is called a mixed number, e.g., $1\frac{1}{2}$. Say, "The mixed number is read one and one half."

STRATEGY 2: Place in envelopes, one for each student, a shape that has been shaded plus a shaded fraction of another shape that has been shaded.

e.g.,



Ask the students to write the fraction that represents the shaded parts.

From the student with a shaded whole, and a shaded $\frac{1}{4}$, elicit the improper fraction, $\frac{5}{4}$. Say, "Yes it is $\frac{5}{4}$, but we have more than 1 whole. We know this because the numerator (top number) is larger than the denominator (bottom number). This is called an improper fraction. We can write this also as 1 whole + $\frac{1}{4}$ of a whole. This would be written as $1\frac{1}{4}$." Write this on the chalkboard.

e.g.,

$$\frac{5}{4} = 1\ \frac{1}{4}$$

Repeat this procedure asking the students to switch envelopes.

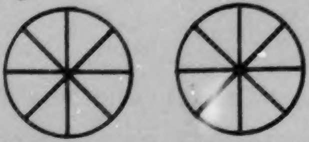
5.14.04

5.14.04.05 divide one or more objects into fractional parts

STRATEGY 1: Say, "If we order two pizzas and we ask to have them cut into eighths, how many slices would we have?"

Draw a diagram on the chalkboard.

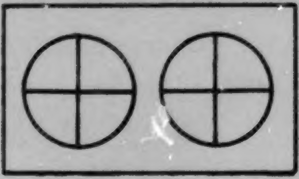
e.g.,

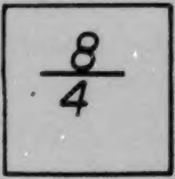


Ask a student to count the slices in each pie. Elicit that each pie has eight slices. Say, "What fraction would represent each pie?" Elicit that the fraction is $\frac{8}{8}$. Now say, "What fraction would represent both pies?" Elicit the improper fraction $\frac{16}{8}$. Repeat this procedure with other fractions.

STRATEGY 2: Prepare two sets of flashcards, one set with shapes divided into fractional parts and the other set with improper fractions representing the shapes.

e.g.,





Play the game Concentration. Ask the students to match the fraction with the shapes.

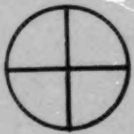
Continue this procedure until all of the shapes and fractions have been correctly matched.

5.14.04

5.14.04.06 **add and subtract fractions $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$**

STRATEGY 1: Have available a flannel board and fractional shapes. Display a whole circle that has been divided into fourths.

e.g.,



Take out one fourth and ask a student to write a fraction representing this on the chalkboard. ($\frac{1}{4}$)

Say "How many fourths did we start with?" Elicit that we started with $\frac{4}{4}$. "We removed $\frac{1}{4}$. How many fourths are left?" Elicit that $\frac{3}{4}$ are left. Ask a student to come to the chalkboard and write a number sentence that shows this, e.g., $\frac{4}{4} - \frac{1}{4} = \frac{3}{4}$. Explain that we subtract the numerators, but not the denominators.

Reverse the procedure. Hold the $\frac{1}{4}$ aside and say, "We have $\frac{3}{4}$ and would like to add $\frac{1}{4}$." Ask a student to come to the chalkboard and write a number sentence that would show this.

$\frac{3}{4} + \frac{1}{4} = \frac{4}{4} = 1$

Say, "$\frac{4}{4}$ is the total and equals 1." Point out that we only add numerators and not the denominators.

Repeat this procedure showing addition and subtraction of fractions.

STRATEGY 2: Prepare a set of flashcards with addition and subtraction of fractions. Write an example on the chalkboard.

e.g.,

$\frac{2}{4} + \frac{1}{4} = \frac{3}{4}$

STRATEGY 2: cont'd

Say, "If we add fractions, we add only the numerators because they tell us the number of parts. We do not add the denominators because that tells us the total number of parts and this does not change. We do the same if we subtract fractions."

Write another example on the chalkboard.

e.g.,

$$\frac{4}{5} - \frac{1}{5} = \frac{3}{5}$$

Say, "We subtract only the numerators and not the denominators."

Use the flashcards to reinforce this concept.

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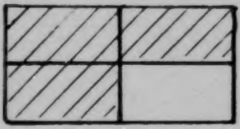
P.O. 5.14.04.01

NAME: ______________________ CLASS: ________ DATE: ________

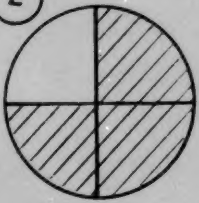
Directions: What part of the whole is shaded?
What part of the whole is not shaded?

①



$\frac{3}{4}$ ______ $\frac{1}{4}$ ______

②



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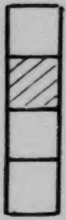
③



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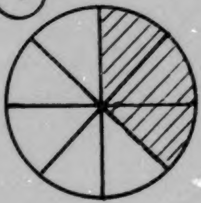
④



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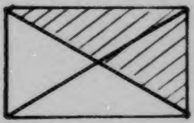
⑤



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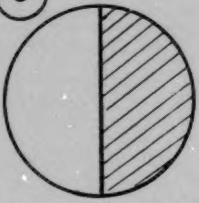

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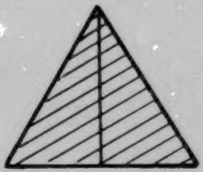

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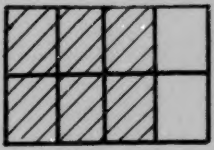

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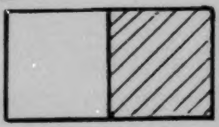
⑨



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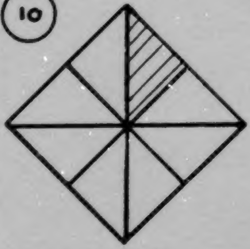

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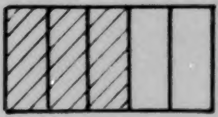
P.O. 5.14.04.02

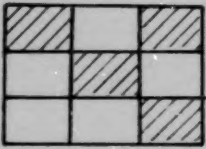
NAME: ____________________ CLASS: ________ DATE: ________

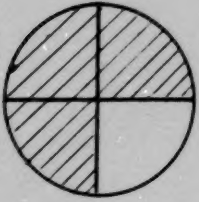
Directions: Count the shaded parts and identify the numerator and the denominator.

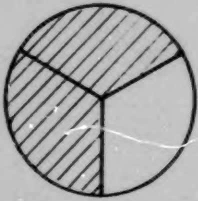


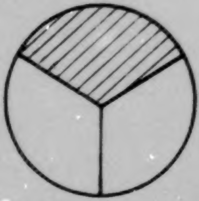
$\frac{3}{5}$ numerator

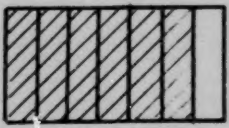
denominator

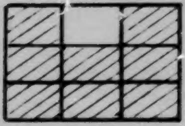


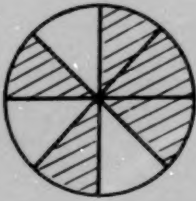


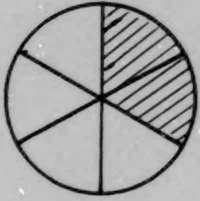


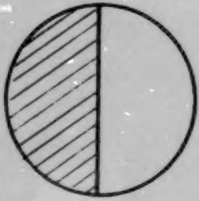


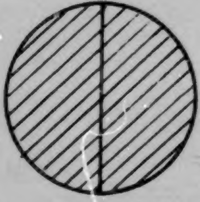


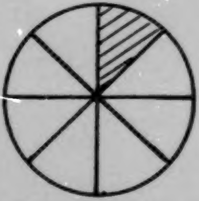








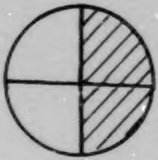




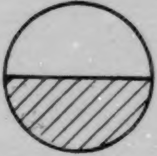
P.O. 5.14.04.03

NAME: ______________________ CLASS: __________ DATE: __________

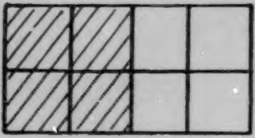
Directions: Name the equivalent fractions.



$\frac{2}{4}$



$\frac{1}{2}$



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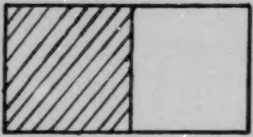

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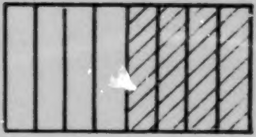

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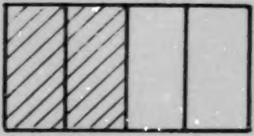

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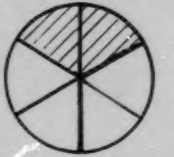

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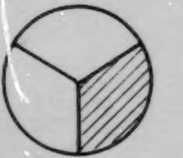

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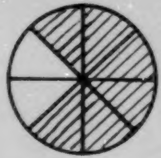

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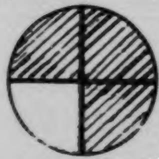

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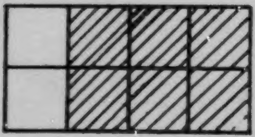

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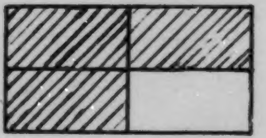

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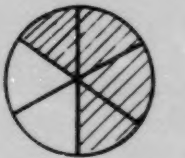

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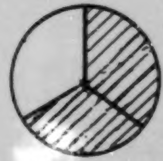

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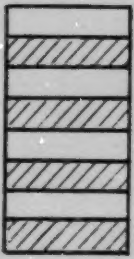

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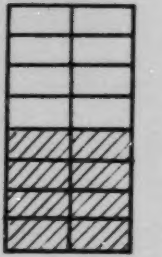

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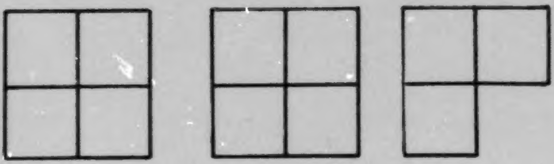
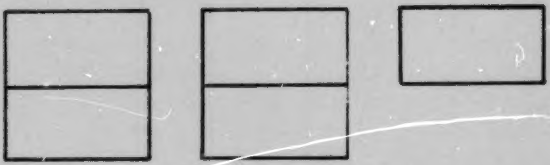
P.O. 5.14.04.04

NAME: ______________________ **CLASS:** __________ **DATE:** ________

Directions: Write the mixed number and the improper fraction shown by the picture.



$2\frac{3}{4}$ ______ $\frac{11}{4}$ ______



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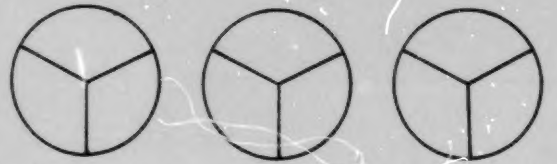

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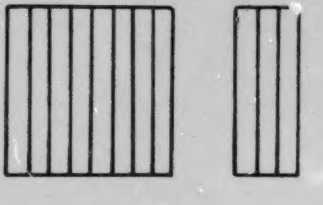

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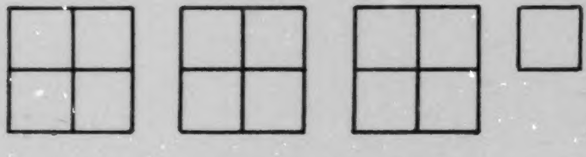

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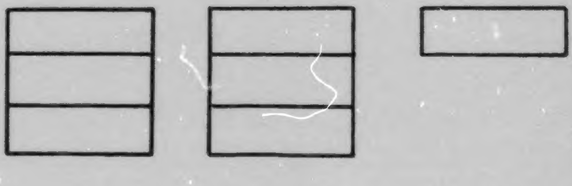

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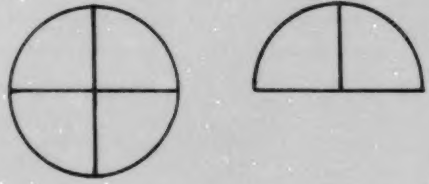

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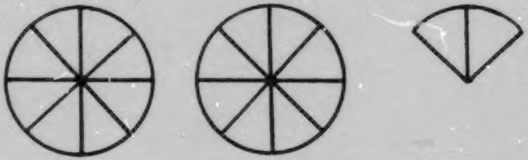

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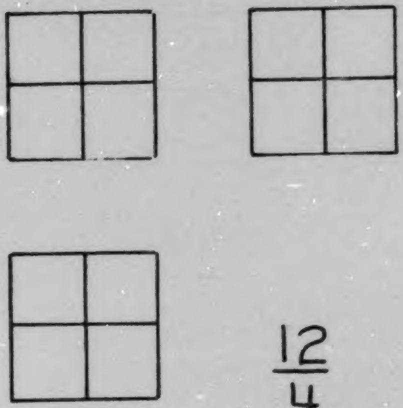
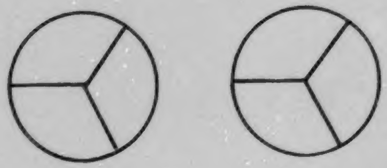
P.O. 5.14.04.05

NAME: ________________________ CLASS: __________ DATE: ________

Directions: Write the fraction that is shown by the diagram.



$\frac{12}{4}$



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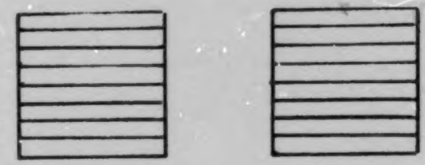

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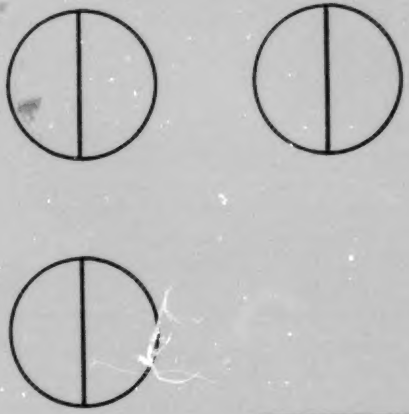

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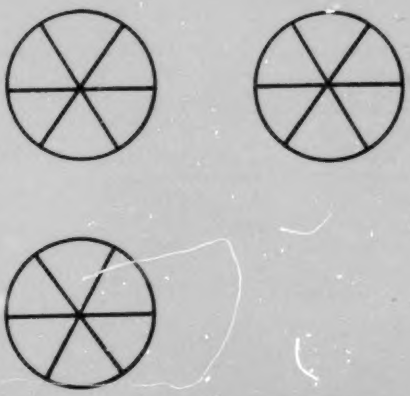

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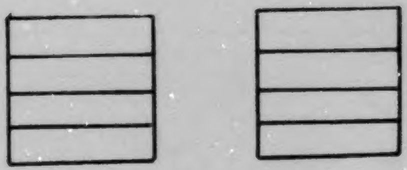

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P.O. 5.14.04.06

NAME: ______________________________ CLASS: ________ DATE: _______

Directions: Add or subtract.

Example $\frac{2}{4} + \frac{1}{4} = \frac{3}{4}$	$\frac{1}{4} + \frac{1}{4} =$
$\frac{9}{10} - \frac{7}{10} =$	$\frac{2}{5} + \frac{2}{5} =$
$\frac{4}{12} + \frac{2}{12} =$	$\frac{2}{3} - \frac{1}{3} =$
$\frac{3}{10} + \frac{5}{10} =$	$\frac{3}{4} - \frac{1}{4} =$
$\frac{4}{5} - \frac{1}{5} =$	$\frac{7}{12} - \frac{2}{12} =$
$\frac{6}{11} + \frac{3}{11} =$	$\frac{4}{9} + \frac{2}{9} =$
$\frac{1}{2} + \frac{1}{2} =$	$\frac{7}{10} - \frac{2}{10} =$

5.06.01 EQUIVALENT FRACTIONS

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.06.01.01A use the multiplicative identity of 1 for fractions to convert a given fraction to an equivalent fraction;

e.g.,

$$\frac{3}{4} \times \frac{2}{2} = \frac{6}{8} \qquad (\frac{2}{2} = 1)$$

$$\frac{3}{4} \times \frac{3}{3} = \frac{9}{12} \qquad (\frac{3}{3} = 1)$$

5.06.01.02A rename fractions as equivalent fractions (in simplest terms) by dividing the numerator and denominator by the same factor;

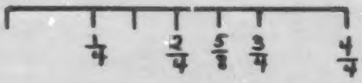
e.g.,

$$\frac{6 \div 3}{9 \div 3} = \frac{2}{3}$$

$$\frac{4 \div 2}{8 \div 2} = \frac{1}{2}$$

5.06.01.03B identify a number between any two fractional numbers (betweenness);

e.g.,



Between $\frac{2}{4}$ and $\frac{3}{4}$ there is $\frac{5}{8}$

5.06.01.04A rename fractions in simplest terms.

e.g.,

$\frac{2}{4} = \frac{1}{2} \qquad \frac{3}{9} = \frac{1}{3}$

5.06.01

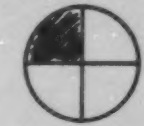
VOCABULARY

TERMS

numerator
denominator
factor
array

GETTING STARTED

Prepare five index cards marked $\frac{1}{5}$, $\frac{2}{3}$, $\frac{2}{4}$, $\frac{3}{5}$, $\frac{1}{2}$, and five index cards with matching fractional illustrations.
Draw the following on the chalkboard.
e.g.,



Say, "How many parts of the pie are shaded?" (1) The number of pieces shaded in the whole is represented by the top number of the fraction called the numerator. How many parts are in the whole pie? (4) The number of pieces in the whole is represented by the bottom number of the fraction, called the denominator. Therefore, the shaded piece represents the fraction $\frac{1}{4}$."

Tape the index cards marked with fractional names to the chalkboard in a column labeled I. Tape the fractional representations to the chalkboard in random order in a column labeled II. Ask different students to come forward and draw a line from the fractional name to the illustration that represents it.

Prepare various arrays on oaktag with gummed circles.

e.g.,

oooo
oooo

ooo
ooo
ooo

ooooo
ooooo

oooooooo

Present the following array to the students and ask them what it represents.

e.g.,

oooo
oooo

Elicit that it is two groups of 4 or 2 x 4 = 8.

GETTING STARTED cont'd

Use various examples to reinforce the relationship of arrays and multiplication facts.

Show $\boxed{\circ\circ\circ\circ\circ}$ and say, "What multiplication fact does this array illustrate?" (1 x 5 = 5) Write the response on the chalkboard. Show 1 x 3. Write 3 x 1 = 3 on the chalkboard. Show $\boxed{\circ\circ\circ\circ\circ\circ\circ\circ}$. Write 1 x 8 = 8 on the chalkboard. Say, "Whenever we multiply a factor by 1 the answer is the same as the factor.

Draw the following on the chalkboard.

O O O O
O O O O
O O O O
O O O O

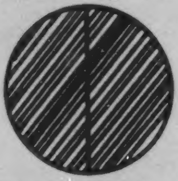
Ask students to come to the front of the room and write the number fact next to the array.

5.06.01

5.06.01.01 use the multiplicative identify of 1 for fractions to convert a given fraction to an equivalent fraction

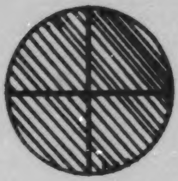
STRATEGY 1: Say, "Fractions are sometimes like people. Like people they can have different names. For example, you are 'Michael'; sometimes you are called 'Mr. Brown'; and your friends call you 'Mike.' But all those names mean you. Fractions have different names that mean the same amount."

Draw the following on the chalkboard.
e.g.,



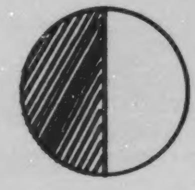
Ask, "How many pieces of pie are there? (2) How many pieces are shaded? (2) What fraction of the pie is shaded?" Elicit that $\frac{2}{2}$ or 1 whole pie is shaded.

Draw a diagram.



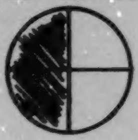
Repeat the same questions to elicit that the fraction represented is $\frac{4}{4}$ or 1 whole pie. Ask the students for other fractional examples of 1 whole.

Ask a student to come to the front of the room and represent $\frac{1}{2}$ of the pie.
e.g.,



STRATEGY 1: cont'd

Draw a line through the middle of the pie and ask the student to name the fraction represented.



"$\frac{2}{4}$"

Say, "Did I change the amount of the shaded region? (No) Therefore, $\frac{1}{2}$ and $\frac{2}{4}$ are equal."

Write $\frac{1}{2} = \frac{2}{4}$ on the chalkboard.

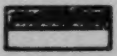
Say, "What can I multiply $\frac{1}{2}$ by to get $\frac{2}{4}$?" Elicit that we can multiply the numerator and denominator by 2, or $\frac{1}{2} \times \frac{2}{2}$.

Reinforce that $\frac{2}{2} = 1$. Say, "When we multiply $\frac{1}{2}$ by $\frac{2}{2}$ we do not change the value of the fraction because we are really multiplying $\frac{1}{2}$ by another name for 1." Repeat this procedure using other examples.

STRATEGY 2:

Prepare 4" x 6" index cards with $\frac{1}{2}$ of the region shaded. Have enough so that each student will get three cards.

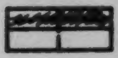
e.g.,



Distribute the cards and say, "What fraction does the card represent?" ($\frac{1}{2}$)

Ask the students to fold their index cards in half and open it again.

e.g.,



Say, "How many boxes do we have now? (4) How many of these boxes are shaded? (2) What fraction does our folded index card represent now?" ($\frac{2}{4}$)

STRATEGY 2: cont'd

Elicit that $\frac{1}{2}$ is still shaded but we have another fractional name for this amount.

Write $\frac{1}{2} = \frac{2}{4}$ on the chalkboard.

Say, "What can we multiply $\frac{1}{2}$ by, to get $\frac{2}{4}$?" Elicit "$\frac{2}{2}$".

Say, "What does $\frac{2}{2}$ equal?" (1 whole)

Write the following on the chalkboard.

$$\frac{1}{2} \times \frac{2}{2} = \frac{2}{4}$$

Say, "Any value multiplied by 1 will equal the same value."

Repeat this procedure using the remaining index cards. Ask the students to fold them into thirds and fourths.

5.06.01.02 **rename fractions as equivalent fractions by dividing the numerator and denominator by the same factor**

STRATEGY 1: Write the following on the chalkboard.

$9 \div 1 =$
$7 \div 1 =$
$14 \div 1 =$
$99 \div 1 =$

STRATEGY 1: cont'd

Ask a student to come to the front of the room and find the quotient. Elicit from the students that every value divided by 1 equals the same value.

Say, "We can also divide a fractional number by a fractional value equal to 1 and get an equivalent fraction."

Write $\frac{9}{12}$ on the chalkboard.

Say, "Is there a number we can divide evenly into the numerator 9 and denominator 12?" (3)

Say, "We will divide 3 into the numerator and denominator of the fraction."

Write the following on the chalkboard.

$$\frac{9}{12} \div \frac{3}{3} = \frac{3}{4}$$

Say, "$\frac{3}{3}$ equals 1, therefore $\frac{9}{12} \div \frac{3}{3}$ is the same as $\frac{9}{12} \div 1$ and the answer, $\frac{3}{4}$, is equivalent to $\frac{9}{12}$.

Repeat this procedure using other examples.

STRATEGY 2:

Prepare 12 red and 12 black chips for each student. Elicit from the students that any value divided by 1 will equal the same value. Write the following on the chalkboard.

$$12 \div 1 = 12$$
$$7 \div 1 = \square$$
$$3 \div 1 = \square$$

Ask a student to fill in the blanks.

Distribute the chips to the students and say, "Use the chips to represent the fraction $\frac{8}{12}$."

STRATEGY 2: cont'd

The students must put up 12 chips, eight of one color, and four of the second color, e.g., 8 red and 4 black.

Ask the students to stack their chips in groups of two. Say, "What fraction do they represent now? ($\frac{4}{6}$) $\frac{8}{12}$ divided into groups of 2 is $\frac{4}{6}$."

Write the following on the chalkboard.

$$\frac{8}{12} \div \frac{2}{2} = \frac{4}{6}$$

Say, "What does $\frac{2}{2}$ equal?" (1)

Write the example, $\frac{8}{12} \div 1 = \frac{4}{6}$.

Have the students represent their chips as $\frac{8}{12}$ again. Ask, "Is there another way we can group the numbers evenly." Elicit the response, "by 4's." Say, "What fraction will be represented when we regroup?" ($\frac{2}{3}$)
e.g.,

$$\frac{8}{12} \div \frac{4}{4} = \frac{2}{3}$$

$$\frac{8}{12} \div 1 = \frac{2}{3}$$

Repeat this procedure using other examples.

5.06.01.03 **identify a number between any two fractional numbers**

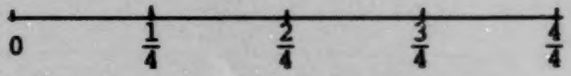
STRATEGY 1: Prepare masking tape and index cards labeled A, 0, 1, $\frac{1}{4}$ through $\frac{4}{4}$, and $\frac{1}{8}$ through $\frac{8}{8}$. Construct a

STRATEGY 1: cont'd

fractional number line by placing four feet of tape on the classroom floor, and use the cards marked "0" and "1" to name the end points. Ask a student to come to the front of the room and, using a piece of chalk, break the line into four equal parts. Say, "How many fractional parts did we break the line into? (4) What do we call each part?" (fourths)

Ask the students to name the fractional part at each break and ask different students to come forward and label the points with index cards marked $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$, $\frac{4}{4}$.

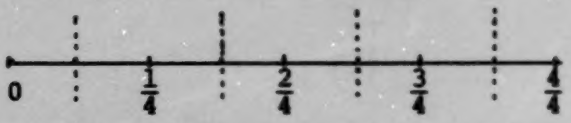
e.g.,



Place the index card marked A between $\frac{2}{4}$ and $\frac{3}{4}$ and say, "What fractional part might A be?"

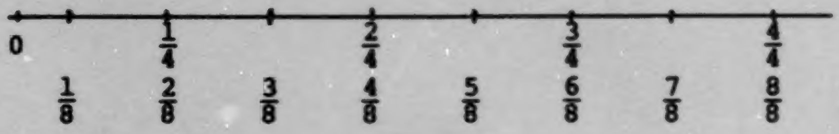
"Are there any fourths between $\frac{2}{4}$ and $\frac{3}{4}$?" (No) Suggest to the students that if we divide our fourths into equal parts, we could find fractions between $\frac{2}{4}$ and $\frac{3}{4}$. Ask a student to come forward and divide all the fourths in half with the chalk.

e.g.,



Say, "What fractional part is the line broken into now?" (eighths)

Ask the students to label the points with index cards marked in eighths.

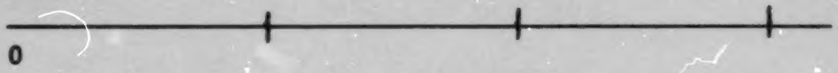


5.06.01

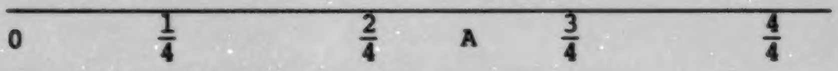
STRATEGY 1: $\frac{5}{8}$ is the fraction between $\frac{2}{4}$ and $\frac{3}{4}$.
cont'd

Repeat this procedure using other examples.

STRATEGY 2: Prepare enough 4" paper circles so that each student will have two. Draw a number line on the chalkboard.



Say, "Our fractional number line on the chalkboard is divided into four equal parts or fourths." Ask different students to come to the front of the room and label the fourths.

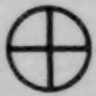


Place an A between $\frac{2}{4}$ and $\frac{3}{4}$ and distribute the two 4" circles to each student as above.

Say, "I want to find a fractional part between $\frac{2}{4}$ and $\frac{3}{4}$. What fractional part might A be?"

Ask the students to take one of their circles and fold it in fourths.

e.g.,



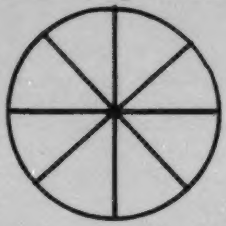
Say, "How would we represent $\frac{2}{4}$?" Shade in two sections. Ask the students to complete this activity.

Ask the students to shade in three sections of the other circle.

STRATEGY 2:
cont'd

Say, "Are there any fourths between $\frac{2}{4}$ and $\frac{3}{4}$? (No) Perhaps we can find a fraction, if we divide our pies into smaller fractional parts."

Ask the students to refold the circles in half, in half again, and in half a third time. When they open their circles, they should look like the diagram below.



Say, "How many parts are in our circles now? (eight) What is each fractional part called? (eighths) How many eighths are in the circle that was representing $\frac{2}{4}$? ($\frac{4}{8}$) How many in the circle that was representing $\frac{3}{4}$? ($\frac{6}{8}$) What fraction comes between $\frac{4}{8}$ and $\frac{6}{8}$? ($\frac{5}{8}$) Therefore $\frac{5}{8}$ is the fraction between $\frac{2}{4}$ and $\frac{3}{4}$."

Repeat this procedure using the other examples.

5.06.01.04 **rename fractions in simplest terms**

STRATEGY 1:

Prepare red and white chips so that each student will get 12 of each color.

Say, "Use the chips to represent the fraction $\frac{6}{12}$. (12 red and 6 white) How could we evenly stack our chips to represent an equivalent fraction. What number can be divided evenly into 6 and 12?" Elicit the responses "2, 3 and 6."

STRATEGY 1: cont'd

Say, "Stack the chips in groups of two. What fraction is represented?" ($\frac{3}{6}$)

Write the following on the chalkboard.

$$\frac{6}{12} \div \frac{2}{2} = \frac{3}{6}$$

Ask the students to stack their chips in groups of three.

Ask a student to come to the chalkboard and write the number sentence to show the regrouping.
e.g.,

$$\frac{6}{12} \div \frac{3}{3} = \frac{2}{4}$$

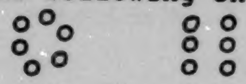
Repeat this procedure, regrouping by 6.

Write an example, $\frac{6}{12} \div \frac{6}{6} = \frac{1}{2}$, on the chalkboard.

Say, "What equivalent fraction on the chalkboard is in its simplest terms? ($\frac{1}{2}$) To rename a fraction in simplest terms, we divide the numerator and denominator by its greatest common factor."

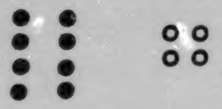
Repeat this procedure using other examples.

STRATEGY 2: Draw the following on the chalkboard.



Say, "We have 12 marbles." Ask a student to come to the chalkboard and use the illustration to represent $\frac{8}{12}$.

Elicit the following drawn response.



STRATEGY 2:
cont'd

Say, "We can represent equivalent fractions of $\frac{8}{12}$ if we divide the marbles into smaller groups. To rename this fraction in simplest terms, we must divide the numerator and denominator by the greatest common factor of 8 and 12."

Ask one student to write the factors of 8 on the chalkboard.
e.g.,

Factors of 8 = 1, 2, 4, 8

Ask another student to write the factors of 12.
e.g.,

Factors of 12 = 1, 2, 3, 4, 6, 12

Say, "What factors are common to both numbers? Which factor is the greatest?" Elicit that the common factors are 1, 2, 4 and 4 is the greatest of the factors. Ask the students to divide eight of the marbles into groups of four.

Say, "What is the new fraction represented?" ($\frac{2}{3}$)

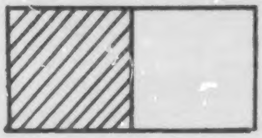
Elicit that $\frac{2}{3}$ is another name for $\frac{8}{12}$ expressed in simplest terms.

Repeat this procedure using other examples.

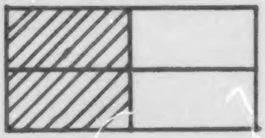
P.O. 5.06.01.01

NAME:______________________________ CLASS:__________ DATE:________

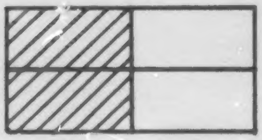
Directions: Find equivalent fractions.



$\frac{1}{2}$



$\frac{1}{2} \times \frac{2}{2} = \frac{2}{4}$



$\frac{2}{4}$

Make Equivalent Fractions.

1. $\frac{3}{4} \times \frac{3}{3} = \frac{\boxed{}}{\boxed{}}$

2. $\frac{3}{10} \times \frac{2}{2} = \frac{\boxed{}}{\boxed{}}$

3. $\frac{3}{4} \times \frac{4}{4} = \frac{\boxed{}}{\boxed{}}$

4. $\frac{1}{6} \times \frac{2}{2} = \frac{\boxed{}}{\boxed{}}$

5. $\frac{2}{3} \times \frac{3}{3} = \frac{\boxed{}}{\boxed{}}$

6. $\frac{4}{6} \times \frac{2}{2} = \frac{\boxed{}}{\boxed{}}$

7. $\frac{1}{3} \times \frac{3}{3} = \frac{\boxed{}}{\boxed{}}$

8. $\frac{1}{4} \times \frac{2}{2} = \frac{\boxed{}}{\boxed{}}$

P.O. 5.06.01.02

NAME: ______________________ CLASS: ________ DATE: ________

Directions: Find equivalent fractions by dividing the numerator and denominator of each fraction by the same number.

$$\frac{6}{8} = \frac{6 \div 2}{8 \div 2} = \frac{3}{4}$$

Find equivalent fractions by dividing.

1. $\frac{4}{12}$

2. $\frac{7}{14}$

3. $\frac{3}{9}$

4. $\frac{4}{6}$

6. $\frac{9}{12}$

7. $\frac{2}{8}$

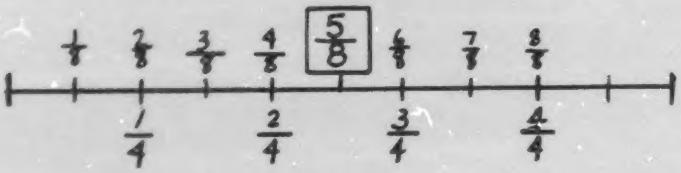
8. $\frac{10}{15}$

9. $\frac{12}{12}$

P.O. 5.06.01.03

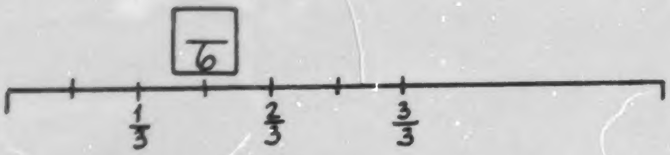
NAME:________________________________CLASS:_________DATE:________

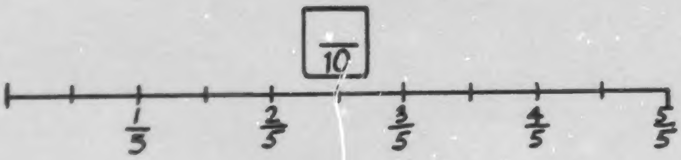
Directions: Fill in the ☐ to name the number between two fractions.



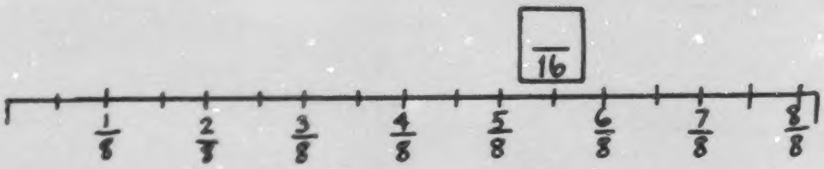
1/8
2/8
3/8
4/8
5/8
6/8
7/8
8/8
1/4
2/4
3/4
4/4

Between $\frac{2}{4}$ and $\frac{3}{4}$ there is $\frac{5}{8}$.





10
1/5
2/5
3/5
4/5
5/5



16
1/8
2/8
3/8
4/8
5/8
6/8
7/8
8/8

P.O. 5.06.01.04

NAME: ______________________ CLASS: ________ DATE: ________

Directions: Rename each fraction in simplest terms.

$\frac{2}{4} = \frac{1}{2}$ $\frac{8}{16} = \frac{1}{2}$

Rename each in simplest form.

1. $\frac{6}{12}$	6. $\frac{9}{36}$
2. $\frac{8}{24}$	7. $\frac{18}{36}$
3. $\frac{3}{18}$	8. $\frac{10}{50}$
4. $\frac{9}{27}$	9. $\frac{9}{72}$
5. $\frac{6}{18}$	10. $\frac{12}{54}$

5.06.02 GREATEST COMMON FACTOR (GCF)
LEAST COMMON MULTIPLE (LCM)

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.06.02.01A determine the greatest common factor (GCF) of two or more numbers using the set method; e.g.,

Find the GCF of 16 and 28 using the set method.

Factors of 16: 1,2,4,8,16
Factors of 28: 1,2,4,7,14,28
Common factors of 16 and 28: (1,2,4)
Greatest common factor of 16 and 28: (4)

We write GCF (16,28) = 4

5.06.02.02A determine the least common multiples (LCM) of two or more numbers, using the set method.

e.g.,

Find the LCM of 8 and 12 using the set method.

Multiples of 8: 8,16,24,32,40,48,56...
Multiples of 12: 12,24,36,48,60...
Common multiples of 8 and 12: (24,48...)

Note: Zero is never used as the LCM.

We write LCM (8,12) = 24

VOCABULARY

TERMS	SYMBOLS
multiple	
factor	
product	
greatest common factor	GCF
least common multiple	LCM

GETTING STARTED

Distribute a set of 12 colored blocks, cubes, discs, or chips to each student in the class. (If it is impossible to obtain counting objects, use graph paper with a set of 12 boxes outlined.)

Ask the students to count the chips to make sure everyone is working with 12. Write 2 x 6 on the chalkboard. Ask the students to show two sets of 6. Say, "What does 2 x 6 equal?" (12)
"2 and 6 are factors of 12." Ask the students to use their chips to show a different multiplication fact for 12. Possible answers will be 3 x 4 and 1 x 12. Elicit from the students that factors of 12 are 1, 2, 3, 4, 6, 12. Say, "Use 8 chips and find the different factors of 8." The set of factors for 8 are 1, 2, 4, 8.

Ask the students to show each number as the product of three factors in as many ways as they can.

e.g.,

12 = 1 x 2 x 6 = 3 x 2 x 2 = 4 x 1 x 3 = 1 x 12 x 1

Continue this procedure using other numbers.

e.g.,

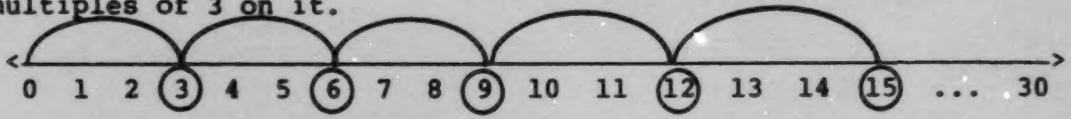
12 18 20
16 24 32
14 15 21

Ask the students to count by twos, fives and tens. Ask one student to write the multiples of 5 on the chalkboard, e.g., 5, 10, 15, 20, 25, 30...

GETTING STARTED cont'd

Elicit from the students that these are also the products of the 5 times table. Say, "These products are also called multiples."

Ask the students to draw a number line in their notebooks and show the multiples of 3 on it.



All numbers circled are multiples of 3.

5.06.02

5.06.02.01 **determine the greatest common factor (GCF) of two or more numbers using the set method**

STRATEGY 1: Prepare small number cards representing the digits 1-9. (Write the numbers on a rexograph sheet and ask a student to help cut them out.) Distribute enough numbers so that each student has four sets of the digits 1-9. Give each student two pieces of yarn to make circles, and a large piece of construction paper.

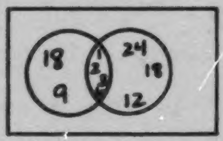
Write the number 18 on the chalkboard and say, "Who can name two factors of 18?" (Accept 2x9, 3x6, 18x1.) Continue this procedure until all the factors of 18 have been given.

Write the number 24 on the chalkboard and say, "Who can name the factors of 24?" (Accept all correct answers.)

Say, "Make two large circles on your construction paper like the drawing on the chalkboard."

18

{2,9,3,6,1,18}



24

{1,24,2x12,8,3,6,4}

Ask the students to use their number cards and place those factors of 18 and 24 which are the same in the area of both circles. Say, "Which factors do 18 and 24 have in common?" Elicit from the students that the factors which 18 and 24 have in common are 1, 2, 3, and 6 and that the greatest factor of these is 6. Say, "6 is the greatest common factor. We write it like this: {18,24}

GCF = 6

5.06.02

STRATEGY 1: cont'd

Repeat this procedure for finding the greatest common factor for the examples below.

{10,15} GCF = ☐   {16,24} GCF = ☐

{14,21} GCF = ☐   {12,18} GCF = ☐

STRATEGY 2:

Write the numbers 8 and 12 on the chalkboard. Say, "What are the factors of these numbers?"

Set A 8 1, 2, 4, 8 1x8 2x4
B 12 1, 2, 3, 4, 6, 12 3x4, 2x6, 1x12

Say, "What are the common factors found in both sets? (1, 2, and 4) Both of these numbers have 1, 2, and 4 as factors. What is the greatest common factor for both sets or the largest factor they both have. (4) We call 4 the greatest common factor or the GCF. Now let's find the GCF for three numbers."

Write the following on the chalkboard and ask a student to come to the chalkboard and circle the common factors.

10	{1, 2, 5, 10	2x5, 1x10}
15	{1, 3, 5, 15	3x5, 1x15}
20	{1, 2, 4, 5, 10, 20	4x5 2x10 1x20}

Say, "What is the greatest factor? The GCF for 10, 15, 20 is 5."

5.06.02.02 **determine the least common multiple (LCM) of two or more numbers using the set method**

STRATEGY 1:

Elicit from the students what they think most people have in common. Refer to certain physical

STRATEGY 1: cont'd

similarities (e.g., brown eyes, brown hair) as things that people have in common. Say, "The children that are in this building have their school in common. Numbers have things in common too. If we count by two's and count by three's, we will find that the multiples of 2 and 3 have some numbers in common. Let's try it!" Ask a student to write the multiples of 2 through 20 on the chalkboard, then ask another student to write the multiples of 3 through 30 on the chalkboard.

e.g.,

2	4	6	8	10	12	14...
3	6	9	12	15	18	21

Point out that 2 and 3 have common multiples of 6 and 12.

Draw a number line on the chalkboard. On the top of the number line write the 4x table; on the bottom of the number line write the 6x table.

e.g.,

0 <-	4	8	12	16	20	24	28	32	36 ->
	6	12	18	24	30	36	42	48	52

Ask several students to come up to the chalkboard and circle only the multiples that are the same and write them in brackets $\{12, 24, 36\}$. Say, "If we want to identify the least common multiple, we take the smallest of these numbers. In this example it is 12, so we write LCM (4,6) = 12."

Repeat this procedure to find the LCM of the following numbers.

(4,8), LCM = ☐
(5,10), LCM = ☐
(6,5), LCM = ☐
(8,7), LCM = ☐
(7,5), LCM = ☐

STRATEGY 2: Draw two empty sets on the chalkboard.

e.g.,

Set A 3 { }
B 4 { }

Next to the empty sets write the numbers 3 and 4.

Say, "We are looking for the first ten multiples of both 3 and 4." Ask a student to name the first ten multiples of 3. Write them in brackets next to the empty set. Repeat this procedure for 4.

e.g.,

A 3 {0 3 6 9 12 15 18 21 24 27 30}
B 4 {0 4 8 12 16 20 24 28 32 36 40}

Say, "What are the common multiples for 3 and 4?" (12,24) What is the least common multiple for 3 and 4? We do not use zero as the least common multiple."

Elicit from the students that since 12 appears in both sets and it is the least common multiple of both numbers, the least common multiple or LCM for 3 and 4 is 12 . Repeat this procedure for three numbers.

e.g., 3, 5, 6

Set
A 3 {0, 3, 6, 9, 12, 15, 18, 21, 24, 27, 30}
B 5 {0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50}
C 6 {0, 6, 12, 18, 24, 30, 36, 42, 48, 54, 60}

Ask the students to draw a ring around the LCM.

P.O. 5.06.02.01

NAME:____CLASS:_________DATE:_______

Directions: Find the Greatest Common Factor.

Factors of 6 : 1, 2, 3, 6

Factors of 12 : 1, 2, 3, 4, 6, 12

Common Factors of 6 and 12 : 1, 2, 3, 6

Greatest Common Factor GCF (6, 12) = 6

Find the Greatest Common Factor.

1. 16 and 24
2. 44 and 55
3. 12 and 20
4. 32 and 48
5. 24 and 40
6. 9 and 30

P.O. 5.06.02.02

NAME: ________________________ CLASS: __________ DATE: ________

Directions: Find the Least Common Multiple.

The multiples of 4 are 4, 8, 12, 16, 20, 24, 28, 36 ...

The multiples of 3 are 3, 6, 9, 12, 15, 18, 21, 24 ...

The common multiples of 4 and 3 are 12 and 24

The Least Common Multiple LCM (3,4) = 12

Write the Least Common Multiple of the numbers.

1. 4 and 9
2. 6 and 8
3. 4 and 10
4. 6 and 11
5. 4 and 12
6. 10 and 20
7. 6 and 14
8. 8 and 9

Unit 13

5.10.01 MEASUREMENT - LINEAR - $\frac{1}{16}$"

(1 lesson)

PERFORMANCE OBJECTIVES

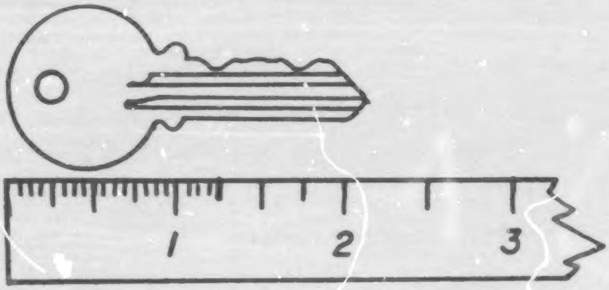
The student will be able to...

5.10.01.01B identify $\frac{1}{16}$ of an inch on a one foot ruler;

e.g.,

5.10.01.02B measure to the nearest inch, half-inch, quarter-inch, eighth-inch, and sixteenth-inch.

e.g.,



5.10.01

VOCABULARY

sixteenths

GETTING STARTED

Prepare ten index cards and write different fractions on the cards, using halves, fourths, eighths.

e.g.,

$$\frac{1}{2} \quad \frac{3}{4} \quad \frac{6}{8}$$

Say, "What does the numerator tell us about a fraction?" Elicit that it tells the number of parts we are talking about. Say, "What does the denominator tell us about a fraction?" Elicit that it tells us the number of equal parts that make up one whole. Divide the class into two teams. One player from each team is selected and dealt a card. Each player must read his fraction card and identify the numerator and the denominator. The student who correctly identifies the parts first gets a card for his team. Two new students are chosen and two more cards are dealt out. The game continues until all the cards are used.

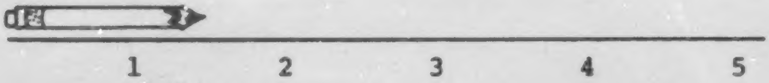
Draw a line on the chalkboard four inches long. Divide the line into two equal parts. Say, "What can you tell us about these two equal parts?" Elicit that they equal one whole. Erase the mark that divided the line in half. Draw three marks on the line, breaking the line into fourths. Ask, "What can you tell us about these parts?" Elicit that they are equal and together: they make one whole. Erase the marks which broke the line into three equal parts. Follow the same procedure as above for fourths and eighths. Stress that the parts are equal and that together the parts make one whole.

5.10.01

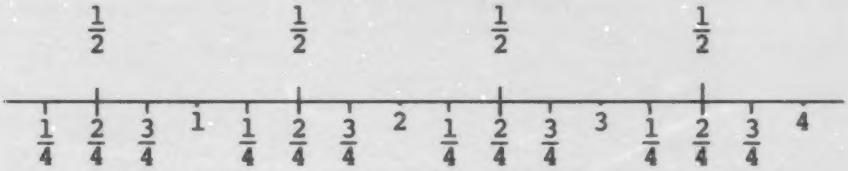
5.10.01.01 identify $\frac{1}{16}$ of an inch on a one foot ruler

STRATEGY 1: Draw a number line on the chalkboard marked off in inches. Above the line tape a pencil to the chalkboard.

e.g.,

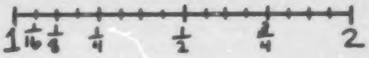


Ask, "Is there a problem in measuring this pencil with this number line?" Elicit from the students that the pencil is more than one inch but less than two inches. Say, "We must construct a number line which is more precise." Elicit from the students the possiblity of breaking the number line into half inches and quarter inches. Say, "Why will this help?" Elicit that we have now broken the line into smaller units and our measuring can be more exact.



Say, "Although our number line is better, it may still be necessary to break it down into smaller units. Eighths and sixteenths are small enough units to allow us to measure most items." Draw another number line which has been broken down into sixteenths. Each marking represents $\frac{1}{16}$ on an inch.

Say, "Let's count the markings and identify our half, quarter, eighth, and sixteenth of an inch markings.



Strategy 2: Divide the students into groups of twos. Distribute to each group one twelve-inch ruler marked off in half inches.

Ask one member of the group to measure the length of his partner's pinky finger. Say, "Is there a problem?" Elicit that the pinky is more than an inch but not as long as an inch and a half. Distribute a twelve-inch ruler which is marked off in sixteenths of an inch. Ask the students to compare the two rulers. Say, "What is the same? What is different?" Elicit that the new ruler is broken into smaller units. Say, "This ruler has markings of sixteenths of an inch, and is more precise. Use your pencil point and identify the following markings: 1", $\frac{1}{2}$", $\frac{1}{4}$", $\frac{3}{4}$", $\frac{3}{16}$", $\frac{9}{16}$", and $\frac{16}{16}$." Walk around the room to see that the students are identifying the proper markings.

Ask the student to measure his partner's pinky finger again and see if this ruler is more exact.

5.10.01.02 **measure to the nearest inch, half-inch, quarter-inch, eighth-inch, and sixteenth-inch**

Strategy 1: Distribute to each student a 12-inch ruler which is marked off in sixteenths of an inch. Say, "Measure your thumb and record your results." Call on some students to give their thumb measurements. Say, "Why do we have different answers?" Elicit that thumbs are different sizes. Distribute one paper clip to each student. Ask half of the class to measure the paper clip starting at $\frac{0}{16}$, the other

Strategy 1: cont'd

half is to measure the identical clip starting at $\frac{4}{16}$. Say, "Are the lengths of the clips equal? Why?" Elicit that the length of the clips is the same, $1\frac{4}{16}$, regardless of where we start to measure.

Strategy 2:

Prepare large yellow ruler cards marked in inches, half inches, quarter inches, eighth inches, and sixteenth inches.

Draw a line on the chalkboard. Select a student to come to the chalkboard and measure the line to the nearest inch. Ask, "Which ruler should you use to measure to the nearest inch?" (The one marked in inches). Let the student record the results on the chalkboard. Select another student to come to the chalkboard. Say, "What ruler should you use if you want to measure the line to the nearest $\frac{1}{2}$ inch?" (The one marked in $\frac{1}{2}$ inches.) Let the student measure and record results on the chalk-board. Call on a third student and ask the student to measure the line to the nearest quarter inch and record the results.

Continue this procedure for eighths and sixteenths. When all of the measuring is completed say, "Which measurement is the most exact? ($\frac{1}{16}$) Which is the least exact?" (inch)

P.O. 5.10.01.01

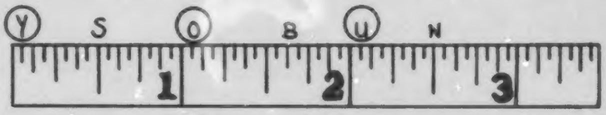
NAME: ______________________ CLASS: ________ DATE: ________

Directions: Read the measurement below each space. Find the measurement on the ruler. Circle the letter that goes with the measurement and write that letter on the blank.

Find the Message

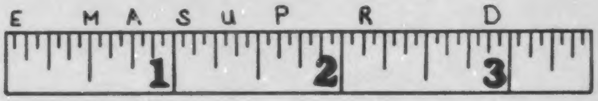
Y O U

$\frac{1}{16}''$ $1\frac{1}{16}''$ $2\frac{1}{16}''$



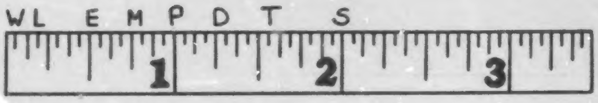
____ ____ ____ ____ ____ ____ ____

$\frac{8}{16}''$ $\frac{1}{16}''$ $\frac{12}{16}''$ $1\frac{1}{16}''$ $1\frac{5}{16}''$ $2\frac{2}{16}''$ $\frac{1}{16}''$



____ ____ ____ ____

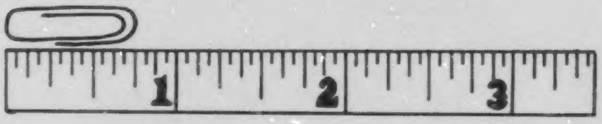
$\frac{1}{16}''$ $\frac{8}{16}''$ $\frac{3}{16}''$ $\frac{3}{16}''$



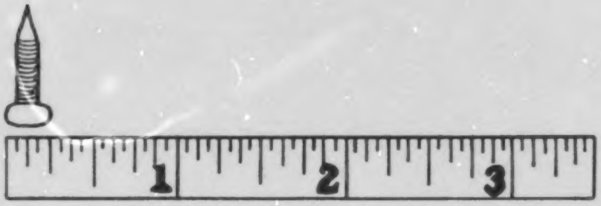
P.O. 5.10.01.02

NAME:____ **CLASS:**__________ **DATE:**________

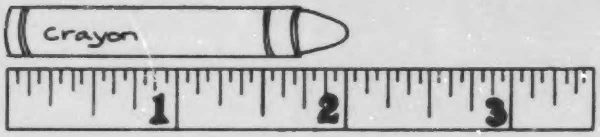
Directions: Read each question and fill in the blank.



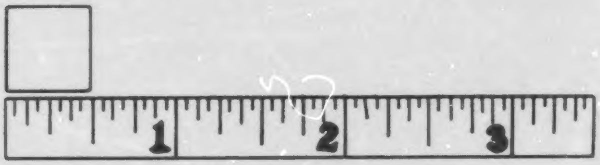
The paper clip is $\frac{3}{4}$ of an inch long. How many $\frac{1}{16}$ of an inch is the paper clip? __________



The top of the screw is $\frac{1}{4}$ of an inch. How many $\frac{1}{16}$ of an inch is the top of the screw? __________



The crayon is 2 inches long. How many $\frac{1}{16}$ of an inch is the crayon? __________

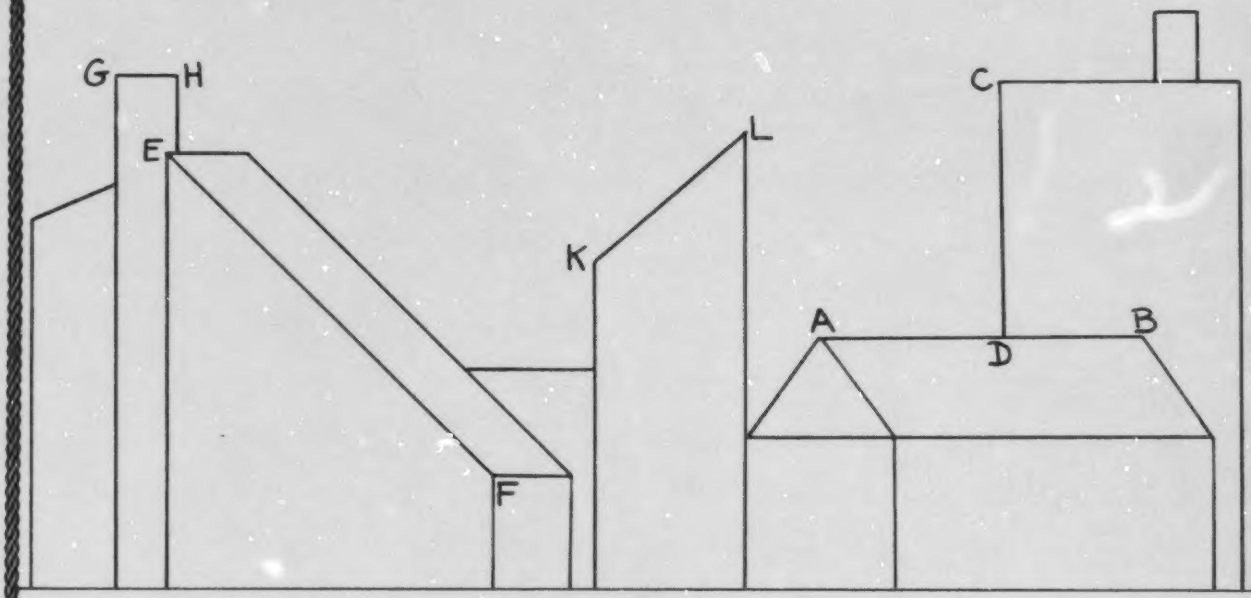


The square is $\frac{1}{2}$ of an inch long. How many $\frac{1}{16}$ of an inch is the square? __________

P.C. 5.10.01.02

NAME: ______________________________ CLASS: ________ DATE: _______

Directions: Measure the city. Write your answer on the line.



1. Measure $\overline{AB}$ to the nearest inch. ____________

2. Measure $\overline{CD}$ to the nearest half inch. ____________

3. Measure $\overline{EF}$ to the nearest quarter inch. ____________

4. Measure $\overline{GH}$ to the nearest eighth of an inch. ____________

5. Measure $\overline{KL}$ to the nearest sixteenth of an inch. ____________

140

5.10.02 LINEAR MEASURMENT - METRIC

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.10.02.01A identify metric prefixes;

e.g.,

milli - one thousandth
centi - one hundredth
kilo - one thousand
m - meter
mm - millimeter
cm - centimeter
km - kilometer

5.10.02.02A solve word problems relating to skills learned in this module.

e.g.,

A man took a long hike and walked 7,000 meters. How many kilometers did he walk?

He walked 7 kilometers.

5.10.02

VOCABULARY

TERMS	**SYMBOLS**
centimeter	cm
millimeter	mm
meter	m
kilometer	km

GETTING STARTED

Distribute centimeter rulers to each student. Ask the students to measure the length of various familiar objects and record the length in centimeters or millimeters, e.g., key = 6cm or 60 mm.

List the following items on the chalkboard in column I: crayon, domino, screwdriver, toothbrush, butterfly, ladybug, stamp, chalkboard, person, racetrack, and highway. In column II list metric units of measure for length: centimeter, millimeter, meter, and kilometer. Ask the students to choose the correct unit of measure listed in column II for the various items in column I.

5.10.02

5.10.02.01 **identify metric prefixes**

Strategy 1: Hold up a meter stick. Say, "When using the metric system to measure length, the meter is the basis for all our measurement. Items larger or smaller than one meter are still related to the meter. Items smaller than a meter are measured in terms of millimeters and centimeters. Items larger than one meter are measured in kilometers. The millimeter is $\frac{1}{1000}$ of a meter and is used to measure very small things. It takes 1000 millimeters to equal 1 meter. The symbol for millimeter is mm. The centimeter is used to measure small objects. The centimeter is $\frac{1}{100}$ of a meter and it takes 100 centimeters to make a meter. The symbol for a centimeter is cm. To measure objects greater than a meter we use kilometers. A kilometer is equal to 1000 meters. The symbol for kilometer is km."

Strategy 2: Write the following words on the chalkboard.

centennial
millennium

Ask the students if they have ever heard of these words. Elicit from the students that a centennial equals a hundred years and a millenium equals a thousand years. Say, "Let's look at the beginning parts of these words - the prefixes. 'Centi' means hundred and 'milli' means thousand. These prefixes also apply to the metric system. The basic measure of length in the metric system is the meter. By adding the prefixes centi, mill and kilo we indicate a different unit of length. To measure things less than a meter we use centimeters and millimeters."

Strategy 2: cont'd Say, "How many millimeters equal a meter? Remember 'milli' means 1000." Elicit that 1000 millimeters equal one meter. Say, "How many centimeters equal a meter? Remember 'centi' means 100." Elicit that 100 centimeters equal 1 meter. Write the following chart on the chalkboard.

1000 millimeters = 1 meter
10 millimeters = 1 centimeter
100 centimeters = 1 meter

Say, "To measure things much greater than a meter, we use kilometers. 1000 meters equal a kilometer. Add this to the chart.

1000 meters = 1 kilometer

Say, "In order to save time when writing these units we use abbreviations or symbols. We start with m for meter and add the appropriate prefix.

millimeter = mm
centimeter = cm
meter = m
kilometer = km

5.10.02.02 **solve word problems related to skills learned in this module**

STRATEGY 1: Distribute to each student a centimeter ruler that has been divided into millimeters. Write the following problem on the chalkboard.

Joe's pencil is 50 millimeters long? How many centimeters is that?

Strategy 1: cont'd Say, "We will try to solve the problem without our rulers. We know that millimeters are smaller than centimeters. Draw a chart on the chalkboard to help the students understand these relationships. e.g.,

						total
millimeter	10mm	10mm	10mm	10mm	10mm	50mm
centimeter	1cm	1cm	1cm	1cm	1cm	5cm

Say, "From our chart can you tell how many centimeters there are in 50 mm? (5) To check our answer let's look at our metric ruler. Are 50 millimeters equal to 5 centimeters? (Yes) Therefore, our answer is correct."

STRATEGY 2: Write the following chart on the chalkboard.

10 millimeters = 1 centimeter
100 centimeters = 1 meter
1000 meters = 1 kilometer

Write the following problem on a piece of construction paper.

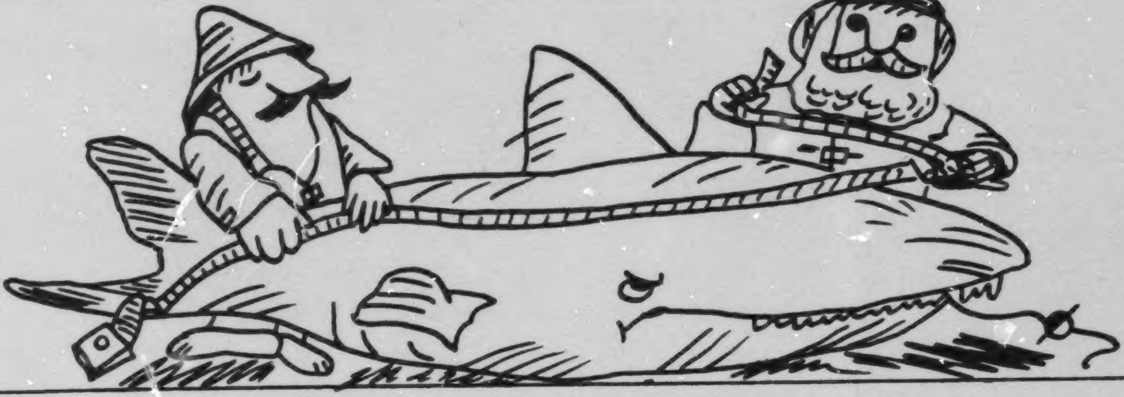
> A man hit a ball 400 centimeters. How many meters did the ball go?

Say, "What is the tricky part of this problem?" Elicit that the hit measured 400 centimeters, but we must find the answer in meters. Say, "Let's look at our chart. What is the relationship between centimeters and meters? (100 centimeters equal 1 meter.) Therefore, to find how many meters there are in 400 centimeters, what should we do?" Elicit that we must divide 400 by 100 to find the number of meters. Say, "400 centimeters equal 4 meters."

P.O. 5.10.02.01

NAME: ____________________ CLASS: ________ DATE: ________

Directions: Fill in the proper metric unit (mm, cm, m, km).



To measure your finger ________

To measure a pin-head ________

To measure the height of a small building ________

To measure the length of highway ________

To measure the length of your pencil ________

To measure the distance from home plate to left field ________

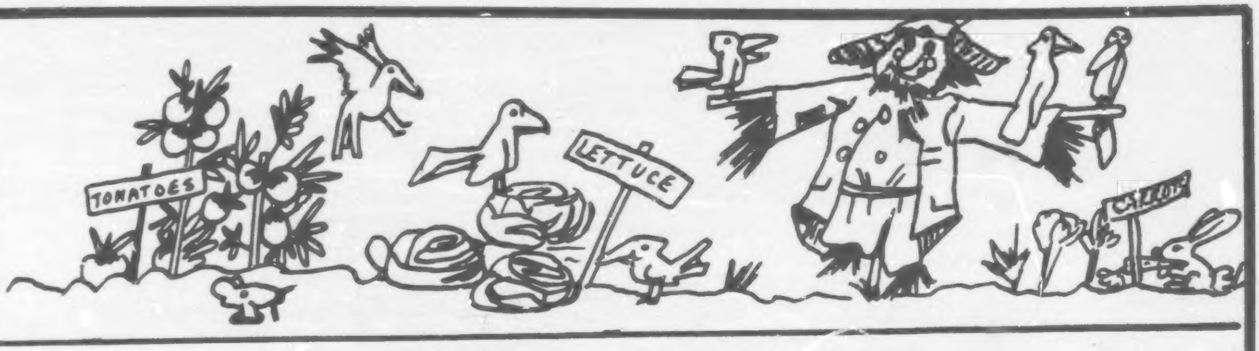
To measure the height of a sky - scraper ________

Why are the numbers 10, 100, 1000 so important in the metric system?

P.O. 5.10.02.02

NAME: ______________________ CLASS: __________ DATE: ________

Solve the following problems.



John walked 3000 meters, how many kilometers did he walk?

Tina's pencil is 50 millimeters, how many centimeters is that?

Carlos threw the ball 800 centimeters.
How many meters is that?

Read the following statements.

Write true if the statement is possible.
Write false if the statement is impossible.

John's father is 8 millimeters tall. __________

Maria's pencil is 5 centimeters long. __________

Jack hit a ball 9 kilometers. __________

Lucy's scratch is 7 millimeters. __________

5.07.01 DECIMALS - THOUSANDTHS

(1 lesson)

PERFORMANCE OBJECTIVES

The student will be able to...

5.07.01.01A identify the place value of decimals through thousandths;

e.g.,

	Ones	•	Tenths	Hundredths	Thousandths
7.462 =	7	•	4	6	2

5.07.01.02B compare decimals expressed as tenths, hundredths, and thousandths, using the symbols >, <, =;

e.g.,

.4 > .16   .71 < 1.7

.16 < .400   .074 < .74

.4 = .400

5.07.01.03A round decimals expressed as hundredths to the nearest whole number.

e.g.,

.81 rounds to 1

3.04 rounds to 3

3.98 rounds to 4

5.07.01

VOCABULARY

TERMS

place value
decimal point

GETTING STARTED

Draw the following on the chalkboard.

H	T	O
3	0	0

Say, "What number is shown in the place value chart?" (300) Then draw the following below the first picture.

H	T	O
	3	0

Say, "What number is shown in this place value chart? (30) By moving the 3 one place to the right what happened to its value?" (It was divided by 10, e.g., 300 ÷ 10 = 30.)

Then draw the following on the chalkboard below the other picture.

H	T	O
		3

Say, "What number is shown in this chart? (3) By moving the 3 from the tens place to the ones place, what happened to its value?" Elicit from the students that it was divided by 10.
e.g.,(30 ÷ 10 = 3) "As we move one place to the right, we divide the value of the place by 10."

Prepare a demonstration set of squared material. Display the hundreds square and say, "This will be our unit." (one whole) Hold up a tens strip, , alongside and say, "What fractional part of the large square is the strip? (one tenth) We can write one tenth two ways."

GETTING STARTED cont'd

Write on the chalkboard, $\frac{1}{10} = 0.1$. Say, "The place to the right of the decimal point is called the tenths place." Count orally with the students by tenths through $\frac{10}{10}$ or 1.0. Demonstrate that 10 tens strips equal the large square.

Display a unit square, and say, "What fractional part of the large square does this represent? ($\frac{1}{100}$). We can write one hundredth either of two ways." Write on the chalkboard, $\frac{1}{100} = 0.01$.

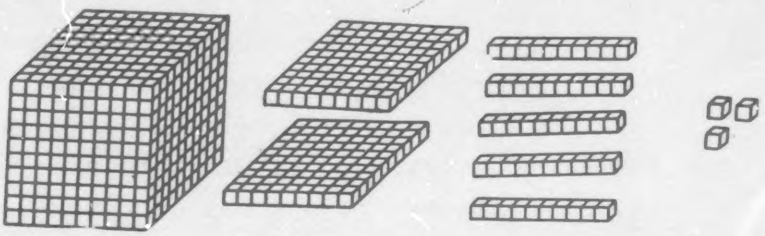
Display a tens strip again and say, "How many hundredths are represented by this strip?" (ten) Display several more fractions through hundredths and ask students to write both their proper form and decimal form on the chalkboard.

e.g., $\frac{23}{100}$ or 0.23 $\frac{38}{100}$ or 0.38

5.07.01

5.07.01.01 **identify the place value of decimals through thousandths**

STRATEGY 1: Prepare a set of base ten blocks. Display the blocks and say, "If the large cube is our unit (one whole), what is the value of the flat sheet? (0.1 or one tenth) What is the value of the strip? (0.01 or one hundredth) What is the value of the small cube?" (0.001 or one thousandth) Ask several students to come to the front of the room and choose a block. Then ask them to form a picture of a mixed decimal by arranging themselves in the proper order.
e.g.,



Draw a place value chart on the chalkboard. Above it write the mixed decimal 1.253. Elicit from the students the correct digit to be put in each place.

ones	•	tenths	hundredths	thousandths
1	•	2	5	3

Read the number aloud (one and two hundred fifty three thousandths) and ask several students to repeat the number aloud. Repeat this procedure with other examples until students can recognize when a number is read as "tenths," or "hundredths," or "thousandths."

5.07.01

STRATEGY 2: Prepare a set of oaktag cards, each with a number from zero through nine on it, and one card with a decimal point. Ask several students to come to the front of the room and select a card. Direct the students to arrange themselves, cards held under their chins, to form a decimal.

e.g.,

$$\boxed{3} \quad \bullet \quad \boxed{4} \quad \boxed{7} \quad \boxed{2}$$

Draw a place value chart on the chalkboard as follows.

ones • tenths hundredths thousandths

Elicit from the students the numbers to be placed in each column. When the place value chart has been correctly completed, ask a student to read the number aloud. Say, "What is the value of the 3? (3 ones) What is the value of the 4? (4 tenths) What is the value of the 7? (7 hundredths) What is the value of the 2?" (2 thousandths) Ask a student to write 4 tenths on the chalkboard. (0.4) Select a student to write 7 hundredths (0.07) and another student to write 2 thousandths (0.002).

Write the following on the chalkboard.

$$3 + 0.4 + 0.07 + 0.002 = 3.472$$

Repeat this procedure using other examples.

5.07.01

5.07.01.02 **compare decimals expressed as tenths, hundredths, and thousandths, using the symbols > < =**

STRATEGY 1: Draw a place value chart on the chalkboard and enter two decimals on it, as follows.

ones	.	tenths	hundredths	thousandths
0	.	1	5	
0	.	0	7	4

Say, "Who can tell us how to write the first number in standard form?" (0.15) Repeat the question for the second number (0.074). Write both numbers on the chalkboard.
e.g.,

0.15
0.074

Say, "We compare decimal numbers in the same way we compare whole numbers. We first compare the digits in the place with the largest value. Which place has the largest value? (ones) Is there a difference between these digits? (no) Which place has the greatest value? (tenths) Is there a difference between these digits? (Yes, 1 > 0) Since one is greater than zero, we don't have to look any further. We know that fifteen hundredths are greater than seventy-four thousandths." Show this on the chalkboard.

0.15 > 0.074

Repeat this procedure with other examples, including examples demonstrating equality.
e.g., 0.3 + 0.30

STRATEGY 2: Prepare a set of base ten blocks. Display the blocks and say, "The large cube is one whole. What is the value of the flat sheet? $(\frac{1}{10})$ What is the value of the strip? $(\frac{1}{100})$ What is the value of the small cube?" $(\frac{1}{1000})$

Write two decimals on the chalkboard.
e.g., 0.251 and 0.087.

Elicit from the students the place value of each number in the decimal. Ask two students to come to the front of the room and show each decimal, using base ten blocks. Say, "We compare decimals as though they were whole numbers, looking first at the place with the largest value. Which place will we examine first? (tenths place) Is the value the same in each tenths place? (No) In which decimal is the value in the tenths place greater? (0.251) So, just as with whole numbers, we need go no further. Which student is showing the larger decimal?" (The one showing 0.251.)
Write the following on the chalkboard.

$0.251 > 0.087$

Repeat this procedure with other examples, including examples demonstrating inequality.
e.g.,

$0.07 = 0.070$
$0.2 = 0.20 = 0.200$

50.07.01.03 **round decimals expressed as hundredths to the nearest whole number**

STRATEGY 1: Draw a number line on the chalkboard.
e.g.,

Ask a student to come to the chalkboard and mark the midpoint between 0 and 1. Say, "How can we

STRATEGY 1: cont'd

name this midpoint as a decimal numeral. (0.5) Write 0.5 on the number line. Ask several other students to come to the chalkboard and estimate where various other decimals between 0 and 1 should be placed.

e.g., 0.78, 0.25, 0.06, 0.62

For each decimal entered on the number line, say, "Between which two whole numbers is 0.78? (0 and 1) What number is the middle point between 0 and 1 on this number line? (0.50) Is 0.78 greater than or less than 0.50? (greater than) Therefore, is 0.78 closer to 0 or to 1? (1) To round 0.78 to the nearest whole number, we round it to 1."

Repeat this procedure with the other decimals drawn on the number line.

STRATEGY 2:

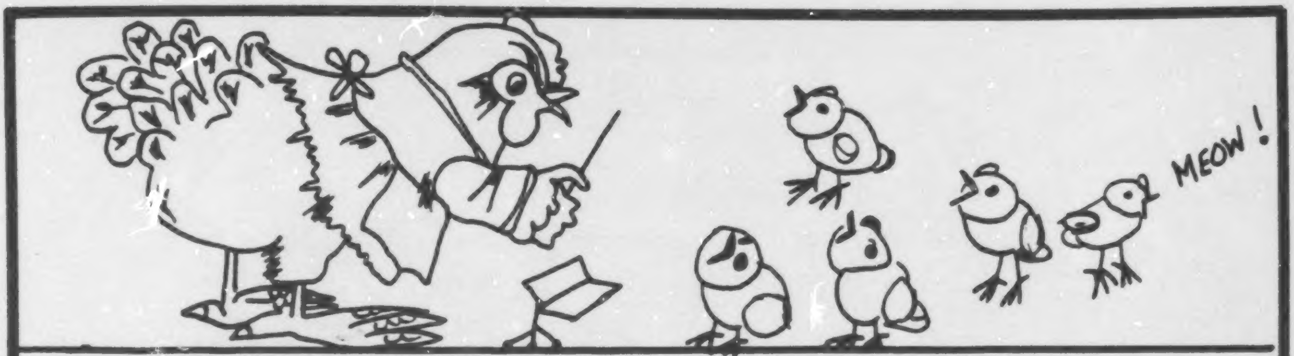
Say, "We can round decimal numbers to the nearest whole number using the same rule we use for whole numbers." Write the number 6.35 on the chalkboard. Elicit from the students the fact that 6.35 is between the whole numbers 6 and 7. Say, "We can decide whether to round 6.35 to 6 or 7 by looking at the digit to the right of the whole number digit. Which digit represents the whole number? (6) Which digit is to the right of it? (3) Because 3 is less than 5, we round 6.35 down to 6 which is what we would do if we were rounding whole numbers."

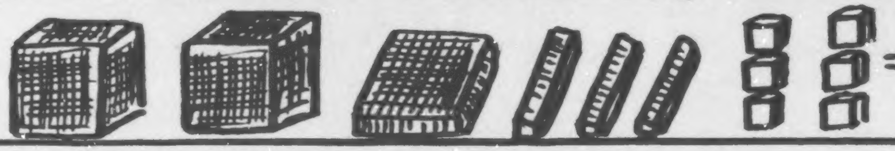
Write the following numbers on the chalkboard.
6.05 6.15 6.25 6.45 6.55 6.65 6.75 6.85 6.95
Discuss the rule for rounding for each number. (Look to the right of the place to be rounded; if the digit is 0, 1, 2, 3, or 4, round down; if the digit is 5, 6, 7, 8 or 9, round up to the next number.) Elicit from the students the rounded number for each of the numbers written on the chalkboard.

P.O. 5.07.01.01

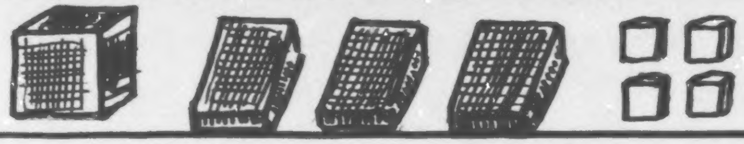
NAME: ______________________ CLASS: ________ DATE: ________

Write the correct decimal number.





= ___ . ___ ___ ___



=

Ones		Tenths	Hundredths	Thousandths	
7	●	0	3	8	=
2	●	1	0	4	=
9	●	9	3	0	=

Five and sixty four hundredths =

Twelve and eight hundred twenty nine thousandths =

Six and three hundredths =

Seventeen and eleven thousandths =

Forty five and eighty hundredths =

P.O. 5.07.01.02

NAME:______________________________CLASS:________DATE:________

Directions: Fill in the frame with either >, < or =.

Ones	tenths	Hundredths	Thousandths		Ones	tenths	Hundredths	Thousandths
0	• 1	5	3	☐	0	• 5	3	1
0	• 2	6		☐	0	• 0	9	8
0	• 0	8		☐	0	• 0	8	0
0	• 9	9	8	☐	0	• 8	9	9
0	• 7	5		☐	0	• 7	5	0

(1) 0.386 ☐ 0.88

(2) 0.075 ☐ 0.75

(3) 0.675 ☐ 0.670

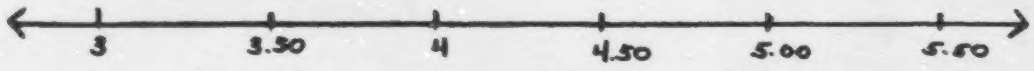
(4) 0.451 ☐ 0.415

(5) 0.862 ☐ 0.86

P.O. 5.07.01.03

NAME:____________________CLASS:________DATE:________

Directions: Round to the nearest whole number. Use the number line if you need help.



3.98	3.33
4.05	4.68
4.47	5.42
16.8	9.7
2.4	15.69
5.22	8.04
135.5	26.50
1.91	99.49

Unit 16

5.07.02 ADDITION AND SUBTRACTION OF DECIMALS THROUGH THOUSANDTHS

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.07.02.01A add and subtract decimals through thousandths and check;

e.g.,

$$\begin{array}{r} 13.042 \\ +\ 4.006 \\ \hline 17.048 \end{array} \qquad \begin{array}{r} 13.042 \\ -\ 4.006 \\ \hline 9.036 \end{array}$$

$$\begin{array}{r} \underline{\text{check}} \\ \underline{17.048} \\ 13.042 \\ \underline{4.006} \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ 4.006 \\ +\ 9.036 \\ \hline 13.042 \end{array}$$

5.07.02.02A solve word problems related to skills learned in this module.

e.g.,

John rode his bike 2.034 km on Monday. On Tuesday he rode 2.131 km. How many km did he ride in all?

estimate	compute	check
2.034 round to 2	2.034	$\underline{4.165}$
2.131 round to $\underline{2}$	$\underline{2.131}$	2.034
	4.165 km	2.131

5.07.02

VOCABULARY

TERMS

decimal
decimal point
tenths
hundredths

GETTING STARTED

Prepare a demonstration set of squared material. Show a large square and say, "This will be one whole." Hold up one large square and 4 ten strips. Say, "What decimal number am I showing?" (1.4; one and four tenths) Draw a place chart on the chalkboard. e.g.,

tens ones tenths hundredths

Ask a student to write one and four tenths in the proper places on the chart.

Repeat the procedure with the following decimal numbers: 3.7, 2.30, 0.04, 1.0, 2.68.

Review place value through thousandths with the students. Ask them to make several rows of boxes on their paper. Be sure they include the decimal point. Illustrate on the chalkboard.
e.g.,

☐☐.☐☐☐

☐☐.☐☐☐

Say, "Place a 4 in the tens place, a 2 in the ones place, a 5 in the tenths place, a 3 in the hundredths place and a 1 in the thousandths place." Then select a student to read the mixed decimal aloud. Repeat this procedure with several different examples. Numbers do not have to be called out in place value order.

5.07.02

5.07.02.01 **add and subtract decimals through thousandths and check**

STRATEGY 1: Prepare a set of base ten blocks. Hold up the large cube and say, "For this lesson, this will be our unit (one whole). What will the flat sheet represent? (1 tenth) What will the bar represent? (1 hundredth) What will the small cube represent?" (1 thousandth) Write the following example on the chalkboard.

$$\begin{array}{r} 1.207 \\ \underline{+2.569} \end{array}$$

Ask two students to collect the appropriate blocks to show their respective numbers. Say, "We add decimal numbers in the same way we add whole numbers. When we add whole numbers, where do we begin the addition? (at the right, in the one's place) When we add decimal numbers we also begin in the place farthest to the right. However, before beginning to add, we make sure the decimal points are lined up and place the decimal point in the sum directly below the addends."

Ask the two students to combine the thousandth cubes. Say, "How many thousandths are there all together? (16) Can we write 16 in any one place? (no) What exchange can we make?" (10 thousandths for 1 hundredth) Ask the students to make the exchange and elicit that the following should be written on the chalkboard.

$$\begin{array}{r} 1 \\ 1.207 \\ \underline{+2.569} \\ .\ \ \ 6 \end{array}$$

STRATEGY 1: cont'd

Ask the students to combine the hundredths, the tenths, and the units, each time writing the part of the sum in the correct place. Ask a student to read the entire example aloud. Repeat this procedure with other addition examples, including those in which the number of decimal places is not the same in each number.

e.g.,

```
 3.06
 0.973             15.47
+8.1             + 6.285
```

In all of the examples the commutative property of addition should be used to check the accuracy of the answer. Direct the students to add the numbers inversely and compare the two answers.

STRATEGY 2: Write the following example on the chalkboard.

9.61 - 4.832 = ______

Ask a student to read the example aloud. Say, "Are we able to do this subtraction?" (Yes, because the minuend is larger than the subtrahend.) Direct the students to turn their notebooks sideways on their desks so that the lines on the paper will serve as columns. Ask the students to write the minuend (9.61) in their notebooks, using only one column for each number or decimal point. Write the following on the chalkboard.

9 . 6 1

Say, "What procedure can we use to correctly line up the subtrahend (4.832) directly below the minuend?" Elicit from the students that we must

5.07.02

STRATEGY 2: cont'd

line up the decimal points. Ask the students to write the subtrahend in their notebooks. Write the following on the chalkboard.

$$\begin{array}{r} 9.61 \\ \underline{-4.832} \end{array}$$

Say, "In order to do this subtraction we must fill in the thousandths place in the minuend. Who can tell us what belongs there?" (zero) Write the zero in the minuend on the chalkboard and elicit from the students that the value of the minuend has not been changed. Elicit from the students the correct placement of the decimal point in the difference, and complete the example as though it contained only whole numbers.

Ask the students to check the accuracy of their answers by adding the subtrahend and the difference to see whether the sum they obtain is the same as the minuend.

Repeat this procedure using other examples.

5,07.02.02 **solve word problems related to skills learned in this module**

STRATEGY 1: Write the following problem on the chalkboard.

> Jack rode his bike 2.034 km. on Monday and 2.131 km. on Tuesday. How many km. did he ride in all?

STRATEGY 1: cont'd

Ask a student to read the problem aloud. Say, "In order to help us solve word problems, we can estimate the answer. Then we can compare our answer to the estimate to see if our answer makes sense. Which operation will we use to solve this problem?" (addition)

Write the example on the chalkboard.

$$\begin{array}{r} 2.034 \\ +\underline{2.131} \end{array}$$

Say, "2.034 is closest to which whole number? (2) Therefore, when we add, our answer should be close to 4." Ask a student to come up to the chalkboard and complete the addition. Say, "Does our answer (4.165 km.) agree with our estimate?" (Yes) Stress the fact that 4.165 by itself is only part of the answer, representing a number of kilometers.

STRATEGY 2: Write the following problem on the chalkboard.

> At the Indianapolis Speedway, a Porsche was timed at 173.054 miles per hour. A Ferrari was timed at 193.2 miles per hour. How much faster was the Ferrari?

Say, "In order to find the difference between two numbers, which operation do we use? (subtraction) What method can we use to be sure we are writing the example correctly?" Elicit from the students that we line up the decimal points. Write the algorithm on the chalkboard.

$$\begin{array}{r} 193.2 \\ -\underline{173.054} \end{array}$$

STRATEGY 2: cont'd

Ask the students to write it in their notebooks, as follows, turning the paper sideways to make use of the columns.

1	9	3	.	2		
-1	7	3	.	0	5	4

Say, "What must we do in order to carry out the subtraction?" Elicit from the students that we must add place holders to the hundredths and thousandths columns of the minuend. Ask the students to add place holders in their notebooks while you add them on the chalkboard.

```
 193.200
-173.054
```

Direct the students to complete the subtraction. Discuss the fact that the difference (20.146) represents miles per hour.

Repeat this procedure with other examples.

P.O. 5.07.02.01

NAME: ______________________________ **CLASS:** __________ **DATE:** ________

Directions: Use addition and subtraction to complete the chart.

Cross-Country Skiing Events

Skier #	Event #1 Points	Event #2 Points	Total Points
62	42.834	39.921	
74	43.172	44.813	
83	45.364		86.501
47		42.186	81.548
55	41.002	43.2	
39	43.019		88.640

Skier #_____ scored the highest number of points.

P.O. 5.07.02.02

NAME:______________________________ CLASS:________ DATE:______

Directions: Read each word problem. Give a guess-timate and an estimate. Then find the exact answer.

Problem	Guesstimate	Estimate	Example -Answer
1. Sam bought two melons. One melon weighed 6.26 kg. the other melon weighed 4.342 kg.. What was the total weight of both melons?			
2. The deepest area of the Atlantic Ocean is 8.648 km. the deepest area in the Pacific Ocean is 11.034 km. How much deeper is the Pacific Ocean at its deepest area?			
3. James spent $18.79 at the sporting goods store. He bought sweat pants and a sweat shirt. The sweat pants cost $10.25. How much did the sweat shirt cost?			
4. The distance from New York City to Albany is 246.337 km. The distance from Albany to Buffalo is 450.8 km. What is the distance from New York City to Buffalo?			
5. The first place runner ran the 400 meter hurdle in 51.006 seconds. He beat the second place runner by 2.731 seconds. What was the finishing time for the second runner?			

5.14.05 MULTIPLICATION

(ongoing)

PERFORMANCE OBJECTIVES

The student will be able to...

5.14.05.01 compute basic multiplication facts through 12 x 12;
e.g.,
2 x 6 = 12   12 x 12 = 144   9 x 7 = 63

5.14.05.02 multiply a 2- or 3-digit number by a 1-digit number with and without regrouping.
e.g.,

$$\begin{array}{r} 42 \\ \times\ 2 \\ \hline 84 \end{array} \qquad \begin{array}{r} 125 \\ \times\ \ 6 \\ \hline 750 \end{array} \qquad \begin{array}{r} 57 \\ \times\ 3 \\ \hline 171 \end{array} \qquad \begin{array}{r} 485 \\ \times\ \ 7 \\ \hline 3,395 \end{array}$$

5.14.05

VOCABULARY

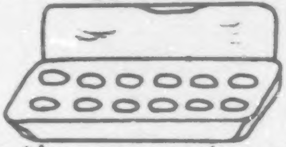
TERMS

factor
product
array

GETTING STARTED

Prepare an egg carton and small counting objects.

e.g.,



••••••••

Display the egg carton and place two counters in each of four compartments. Point to the sets one at a time and ask the students to count the number of objects in each compartment. Write the numbers on the chalkboard.

e.g.,

$$2 + 2 + 2 + 2 = 8 \qquad 4 \times 2 = 8$$

Say, "How many sets of 2 do you see? (4) How many counters all together?" (8)

Repeat this procedure with similar problems.

Distribute chips to each student. Say, "Show 3 groups of 4." Look around the room to make sure the students make the 3 groups.

e.g., •••• •••• ••••

Say, "How many groups did you make? (3) How many chips in each group? (4) How many chips in all?" (12)

Write the following on the chalkboard.

$$4 + 4 + 4 = 12 \qquad 3 \times 4 = 12$$

Repeat this procedure using other multiplication facts.

GETTING STARTED cont'd

Use other examples.

e.g.,

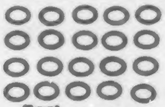
Item	Question
3 pairs of shoes	How many feet?
2 hands	How many fingers?

5.14.05

5.14.05.01 **the student will be able to compute basic multiplication facts through 12 x 12**

STRATEGY 1: Distribute one sheet of graph paper to each student.

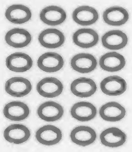
Draw the following array on the chalkboard.



Say, "Who can write a multiplication sentence for this array? Remember the first factor will tell the number of rows and the second factor will tell the number in each row."

The array shows 5 x 4 = 20. Say, "On your graph paper, show an array for 6 x 4 and give its product."

The students should show



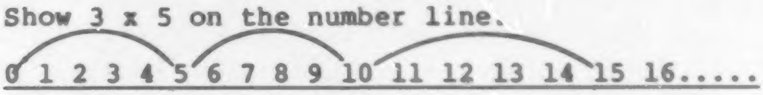
6 x 4 = 24

Repeat this procedure to find the products through 12 x 12.

Use flashcards to drill facts.

STRATEGY 2: Prepare a number line from 0 through 100, large enough to tape across the chalkboard.

Show 3 x 5 on the number line.



Say, "How many spaces does each jump cover? (5)

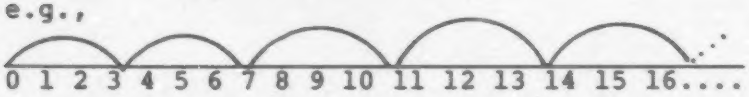
How many jumps of five are shown on this number line?" (3)

STRATEGY 2: cont'd

"What multiplication sentence would show three jumps of five?" (3 x 5 = 15)

Show 6 x 4 on the number line.

e.g.,



Ask "How many spaces does each jump cover? (4)

How many jumps are shown on this numberline? (6)

What multiplication sentence would show six jumps of four?" (6 x 4 - 24)

Call one student to the chalkboard to show 7 x 9 on the number line and write the multiplication sentence.

Write the following on the chalkboard. Say "Use the number line to find the products."

7	9	10	11	12	6	8
x8	x6	x10	x 3	x 4	x5	x3

5.14.05.02 **the student will be able to multiply a 2- or 3-digit number by a one digit number with and without renaming**

STRATEGY 1: Prepare place value mats out of heavy oaktag and label the columns Hundreds, Tens, and Ones. Distribute one to each student, with an ample supply of tens and unit squared materials.

(The mats can be covered with clear contact and used all year long for addition and subtraction...)

Write on the chalkboard.

32
x3

STRATEGY 1: cont'd

Elicit from the students that 32 can be renamed as 30 + 2. Say, "Place tens and ones on the place value mats to show 30 + 2 three times. How many times did we show 32? (3) How many tens and ones do we have?" Elicit from students that we have 9 tens and 6 ones (96). Write on the chalkboard.

Say, "Multiply the ones column. How much is three times 2 ones?" Elicit from students that the product is 6. Write it in the ones column. Say, "How much is three times 3 tens?" Elicit from students that the product is 9 tens. Write it in the tens column.

Repeat this procedure using other examples.

STRATEGY 2: The students will need their notebooks and pencils for this exercise.

Write the problem $\begin{array}{r}26\\ \underline{\times\ 3}\end{array}$ on the chalkboard. Say, "We can rename 26 as 20 + 6."

$$\begin{array}{rrl} 26 = & 20 + 6 & \\ \underline{\times 3} & \underline{\times\quad 3} & \\ & 10 + 8 & \text{Step 1. Multiply ones.}\quad 3 \times 6 = 18 \\ + & \underline{60 + 0} & \text{Step 2. Multiply tens.}\quad 3 \times 20 = 60 \\ & 70 + 8 & \text{Step 3. Add the products.} \end{array}$$

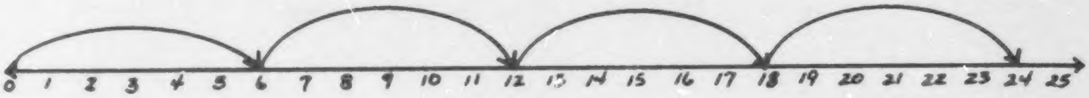
The answer to the problem $\begin{array}{r}26\\ \underline{\times\ 3}\\ 78\end{array}$

Repeat this procedure using other examples.

P.O. 5.14.05.01

NAME: ____________________ CLASS: ________ DATE: ________

Directions: Find the products.


0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

4 X 6 = ____

1. 3 x 6 = ____
2. 8 x 4 = ____
3. 9 x 6 = ____
4. 10 x 4 = ____
5. 11 x 5 = ____
6. 12 x 12 = ____
7. 6 x 8 = ____
8. 12 x 7 = ____
9. 9 x 4 = ____
10. 12 x 1 = ____
11. 11 x 0 = ____
12. 3 x 8 = ____
13. 9 x 5 = ____
14. 9 x 10 = ____
15. 6 x 1 = ____
16. 7 x 0 = ____
17. 8 x 6 = ____
18. 9 x 4 = ____
19. 3 x 5 = ____
20. 7 x 11 = ____
21. 12 x 3 = ____
22. 6 x 6 = ____
23. 8 x 8 = ____
24. 8 x 9 = ____

P.O. 5.14.05.02

NAME:______________________________ CLASS:________ DATE:________

Directions: Find the product.

36 x 3	46 x 4	53 x 6	82 x 4
96 x 3	82 x 9	47 x 6	86 x 5
126 x 3	157 x 3	485 x 7	962 x 8
816 x 4	821 x 9	187 x 6	248 x 9

5.04.01 MULTIPLICATION OF MULTIPLES OF TEN BY MULTIPLES OF TEN

(1 lesson)

PERFORMANCE OBJECTIVES

The student will be able to...

5.04.01.01B multiply multiples of ten in horizontal format;

e.g.,

$10 \times 10 = 100$

$20 \times 10 = 200$

$30 \times 10 = 300$

5.04.01.02A multiply multiples of ten in vertical format;

e.g.,

$$\begin{array}{r} 10 \\ \underline{\times 10} \\ 100 \end{array} \qquad \begin{array}{r} 20 \\ \underline{\times 10} \\ 200 \end{array} \qquad \begin{array}{r} 30 \\ \underline{\times 10} \\ 300 \end{array}$$

5.04.01.03A solve word problems related to skills learned in this module.

e.g.,

A teacher has 90 boxes of pencils. There are 40 pencils in each box. How many pencils does the teacher have in all?

$90 \times 40 = 3600$ pencils

5.04.01

VOCABULARY

TERMS

factors
product
related
multiples

array
dimensions
vertical
horizontal

GETTING STARTED

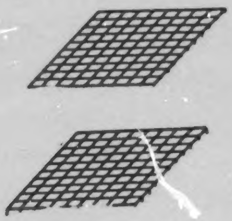
Play the game, Guess My Number. Say, "I'm thinking of a product that is in the nine times table and the eight times table. See if you can tell us the factors as well as the product." Select a student to try and guess the fact. Continue until one student guesses the number. (8 x 9 = 72) The student who guesses the number is entitled to pick his/her own number (only known to himself/herself and the teacher). The class must now try to guess his/her new number. The students who are playing must not only say the factors but must listen carefully so they know what factors have been eliminated.

Prepare 15 cards with a multiple of ten multiplied by a one digit number written on them, e.g., 30 x 5, 70 x 3, 40 x 5. Divide the class into two teams. Two players from each team are selected. Hold up a card. Whoever calls out the answer first will score a point for his/her team. The students are only permitted one guess; if their answer is wrong their opponent will have 20 seconds to guess the answer. Two new players are chosen and a new card is shown. The game continues in this manner until there are no more cards. The team with the most points wins.

5.04.01

5.04.01.01 multiply multiples of ten in horizontal format

STRATEGY 1: Distribute four pieces of squared material (10 by 10) to each student. Say, "Hold one piece of squared material in front of you. How can this array be expressed as a multiplication problem? (10x10) What is the product?" (100) Record the answer on the chalkboard. Say, "Place another squared piece below the first." Demonstrate this on the chalkboard. e.g.,



Say, "Is this array the same as the first? How can this array be expressed as a multiplication problem? (20x10) What is our product? (200)." Record this example below the first. Say, "Now place another squared piece under the other two. Is this array the same as the second? How can this array be expressed as a multiplication problem? (30x10) What is our product?" (300) Record this example below the second.

10x10 = 100
20x10 = 200
30x10 = 300

STRATEGY 1: cont'd

Elicit from the students a pattern between the factors and the product. Say, "What is the pattern? The number of zeros after each factor tells us how many zeros are in the product. In our examples there is one zero at the end of each factor. That tells us there will be two zeros in the product. Continue recording examples on the chalkboard (e.g., 40x10, 50x10, ...) to see if the pattern holds true.

STRATEGY 2:

Prepare bead boards (10 by 10) and distribute three to each group of three students. Say, "Put one board in the center of your desk. How can this array of beads be distributed to show a multiplication example?" (10x10 = 100) Write this on the chalkboard. Say, "Place another bead board (10 by 10) below the first. We have changed the array. What multiplication example does it show? How many beads are down? (20) How many are across? (10) What is the multiplication example? (20x10 = 200) Now place another bead board on your desk. What multiplication example does this array show?" (30x10 = 300) Ask the students to look at the examples on the chalkboard.

10x10 = 100
20x10 = 200
30x10 = 300

Say, "Now without using our beads let's look at the factors. What example comes next?" (40x10 = 400) Record 40x10 = 400 below the third example. Elicit from the students that a pattern exists between the factors and the product. Say, "The number of zeros at the end of each factor determines how many zeros will be in the product."

Repeat this procedure using other examples.

5.04.01.02 multiply multiples of ten in vertical format

STRATEGY 1: Prepare graph paper (20 by 20). Distribute three sheets of graph paper to each student. Tape several pieces of graph paper to the chalkboard. Outline an array (10 x 10) on the chalkboard. Say, "Outline a 10 x 10 array on your paper with a pencil. What is the multiplication example that this array shows?" (10x10) Write 10 x 10 on the chalkboard. Say, "Is there another way of writing this example? We can write it in vertical format. On your paper inside the area you have marked off write the following.

$$\begin{array}{r} 10 \\ \underline{\times 10} \\ 100 \end{array}$$"

Ask a student to write the vertical format on the chalkboard.

Select another student to come to the chalkboard and outline an array which is 20 by 10. Ask the students to draw a similar array outlined in pencil on their papers. Say, "How can we write this as a multiplication example? (20x10 or 10x20) Now write the problem in vertical format."

STRATEGY 2: Prepare multiplication cards for each student in the class. If there are 32 students prepare 16 cards with examples of multiples of 10 written in vertical format.

e.g.,

$$\begin{array}{r} 30 \\ \underline{\times 10} \end{array} \quad \begin{array}{r} 40 \\ \underline{\times 20} \end{array} \quad \begin{array}{r} 90 \\ \underline{\times 40} \end{array} \quad \ldots$$

and sixteen cards with matching answers.

300 800 3600 ...

Mix the example and answer cards together. Distribute one card to each student. Select one student with an example card. Say, "Read your example."

STRATEGY 2: cont'd

(e.g., 40x20) The student with the matching answer card must then stand and say 800. The student with the example card must verify if the answer is correct or incorrect. If it is correct another student is chosen. If the answer is incorrect the student holding the correct answer must identify himself/herself.

Variation. First select a student with an answer card. Then ask the student with the matching example card to identify himself/herself.

5.04.01.03 **solve word problems related to skills learned in this module**

STRATEGY 1:

Prepare one index card for each student. The index cards will represent the number of boxes of pencils in the example. Distribute the cards to the students.

Say, "I gave out 30 boxes of pencils. There are 20 pencils in each box. How many pencils do I have? Let's draw a picture so we can better understand this problem. How many pencils will you draw in your box?" (20, because there are 20 pencils in a box.) Ask the students to draw 20 pencils on their cards.

Say, "How can we solve this problem?" Demonstrate how one way of solving the problem is to go around taking each students card and adding by 20, e.g., 20+20+20+20. After collecting four cards, say, "This will give me the right answer but it will

STRATEGY 1: cont'd

take too long. Is there a faster way of finding the answer?" (Multiply) Select one student to come up to the chalkboard and write the example. If the student writes it horizontally (30x20), ask another student to write it vertically ($\begin{array}{r}30\\ \underline{\times 20}\end{array}$).

Say, "How can I find the product. Count the zeros that are in the product. What two factors do we multiply? (3x2) What is the final product?" (600) Check the answer by asking a student to count by twenty's orally. (20, 40, 60, 80, 100 ...)

STRATEGY 2: Write the following example on the chalkboard.

There are 10 cartons of apples in a store. Each carton contains 20 apples. How many apples are in the store?

Next to the problem draw a chart with the following headings.

Number of cartons	Apples in a carton	Total number of apples

Say, "When solving a problem it is useful to simplify it. For example, if we have one carton with 20 apples, how many apples do we have?" (20 apples) Select a student to fill in the appropriate columns on the chart with the numbers 1, 20, 1x20 = 20. Say, "What if we had five cartons instead of one? How many apples would we have?" Ask a student to come up and fill in the correct numbers in the appropriate columns. Say, "Is 100 apples the answer to our problem? (no) In our problem we don't have five cartons but 20 cartons. Now what if we had ten cartons of apples? Which numbers would go in the columns?" Select a student to write 10, 20, 10x20 = 200 in the three sections.

STRATEGY 2: cont'd

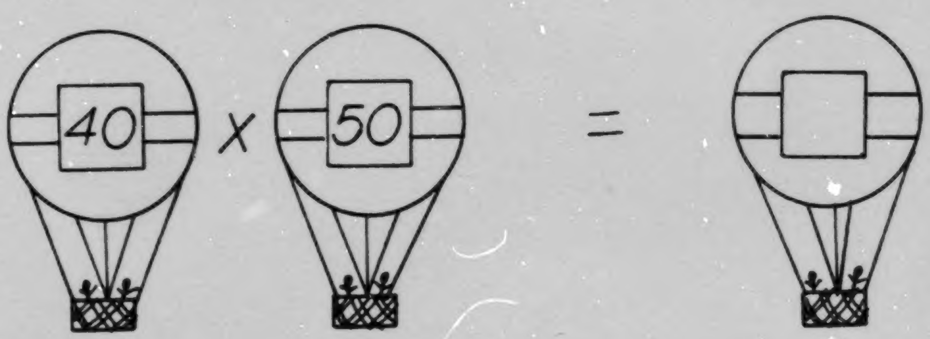
Say, "How did we obtain the product 200? We counted the number of zeros in the factors and that told us how many zeros will be in the product. In this case, two zeros and 1x2 = 2 gives us 200. Is this our answer?" (Yes, because the store has ten cartons and 10x20 = 200 apples.)

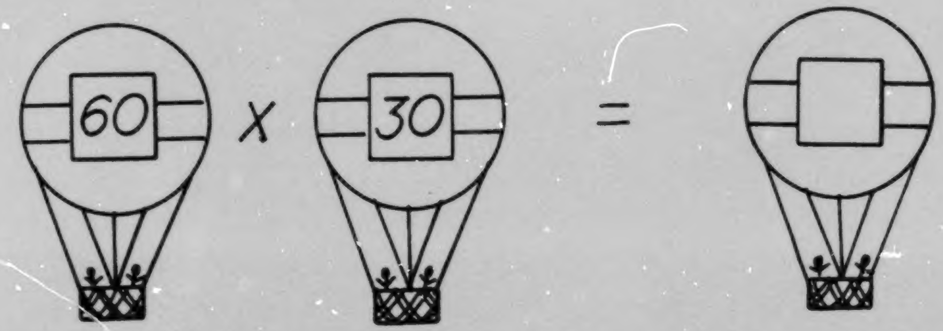
P.O. 5.04.01.01

NAME: ______________________ CLASS: __________ DATE: ________

Directions: Complete the chart. Fill in the balloons.

X	10	20	30	40
10				
20				
30				
40				

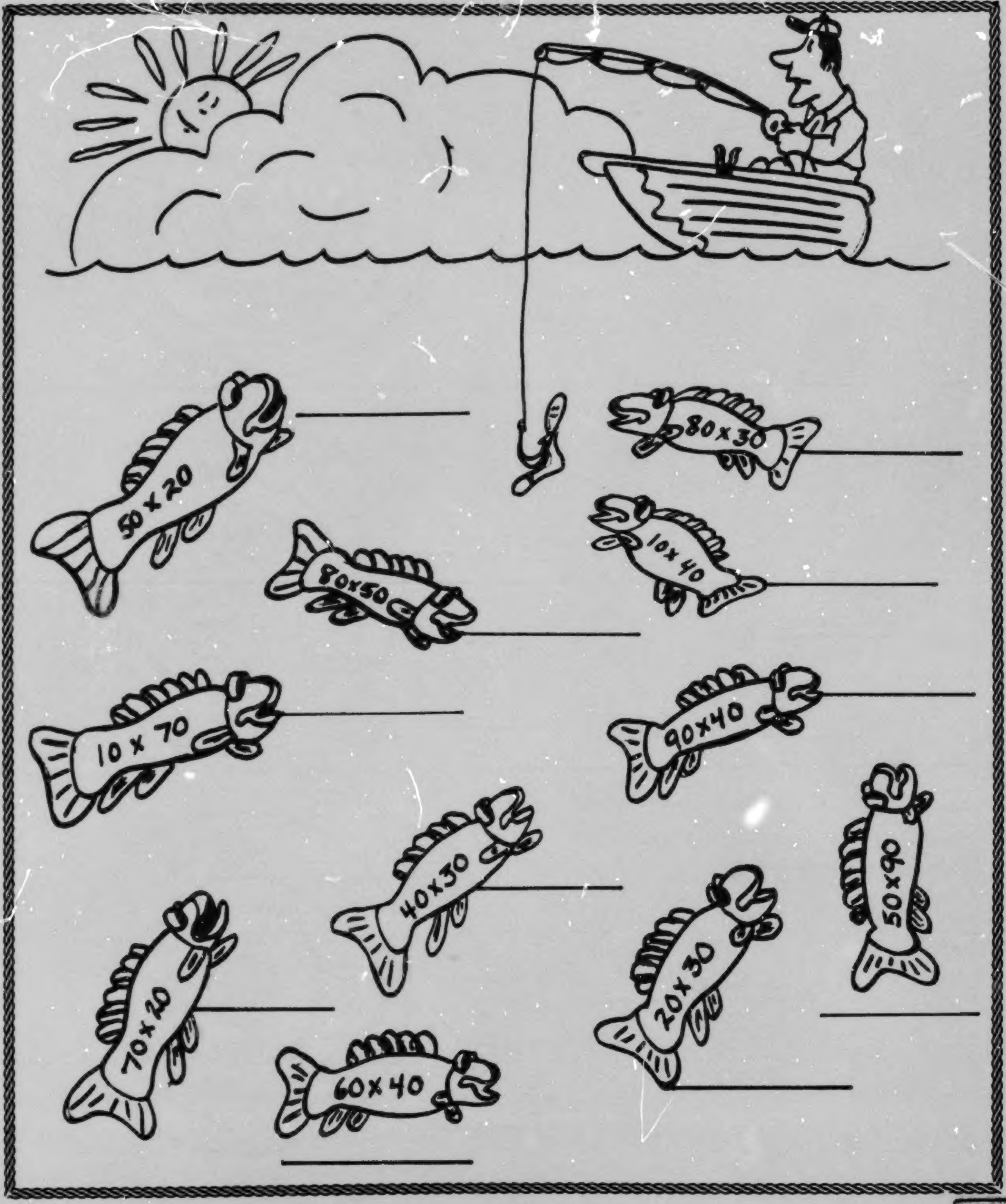




P.O. 5.04.01.01

NAME: ______________________ CLASS: ________ DATE: ________

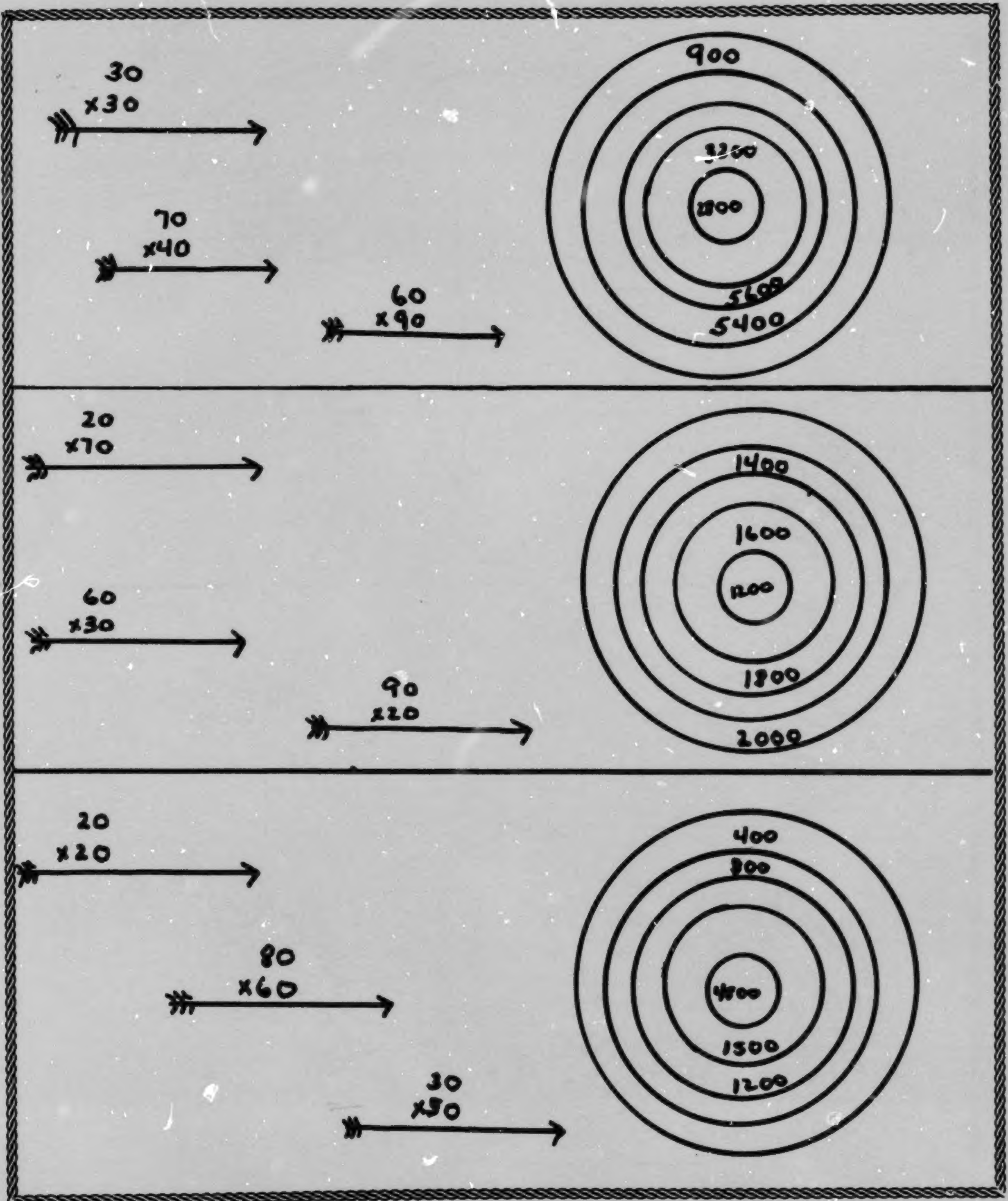
Directions: How many fish can you catch? Multiply the factors in the fish. Write your answer on the line under or next to the fish.


50 x 20
80x30
10x40
80x50
10 x 70
90x40
40x30
50x90
70x20
20x30
60x40

P.O. 5.04.01.02

NAME:____CLASS:_________DATE:________

Directions: Multiply. Draw a line from the arrow to the number on the Target that matches your answer.


30
x30
70
x40
60
x90
900
3200
2800
5600
5400
20
x70
60
x30
90
x20
1400
1600
1200
1800
2000
20
x20
80
x60
30
x50
400
300
4800
1500
1200

P.O. 5.04.01.03

NAME: ______________________ CLASS: ________ DATE: ________

Directions: After you solve each problem write the answer on the line at the right.

POTATO CHIPS

1. The candy store owner had 20 boxes of gumballs in his store. Each box had 80 gumballs in it. How many gumballs were in all the boxes?

2. There were 10 cylinders of pretzels in the candy store. Each cylinder had 30 pretzels in it. How many pretzels did the store owner have all together?

3. On a shelf were 40 boxes of lollipops with 80 lollipops in each box. How many lollipops were there in all?

4. A rack of potato chips had 20 rows with 20 bags of potato chips in each row. How many bags of potato chips were on the rack in all?

P.O. 5.04.01.03

NAME:____________________________________CLASS:_________DATE:_______

Directions: Solve.

1. There were 90 buses going on a tour of the Great Lakes. Each bus carried 40 people. How many people toured the Great Lakes?

2. On the first Sunday in June 60 families reserved picnic tables at the park. If there were 20 people in each family how many people were in the park?

3. There will be 80 students at Graduation. Each person will have 10 guests. How many people will attend the Graduation?

4. John counted 80 seeds from one pine cone. He then counted 50 pine cones on a tree. How many seeds were on the tree?

5.04.02 MULTIPLICATION OF TWO 2-DIGIT NUMBERS

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.04.02.01B use the distributive property of multiplication over addition to multiply two 2-digit numbers in horizontal format; e.g.,

$$\begin{aligned} &36 \times 15 = \\ &15 = 10 + 5 \\ &\text{Then} \\ &36 \times 15 = 36 \times (10 + 5) \\ &\qquad\quad = (36 \times 10) + (36 \times 5) \\ &\qquad\quad = 360 + 180 \\ &\qquad\quad = 540 \end{aligned}$$

5.04.02.02A multiply a 2-digit number by a 2-digit number in vertical format; e.g.,

$$\begin{array}{rl} 36 & \\ \times 15 & \\ \hline 180 & (\ 5 \times 36) \\ 360 & (10 \times 36) \\ \hline 540 & (15 \times 36) \end{array}$$

5.04.02.03A solve word problems related to skills learned in this module.

e.g.,

There are 12 eggs in one dozen. How many eggs are there in 17 dozen?

$$\begin{array}{rl} 17 & \\ \underline{\text{x}12} & \\ 34 & (2 \times 17) \\ \underline{170} & (10 \times 17) \\ 204 & (12 \times 17) \end{array}$$

5.04.02

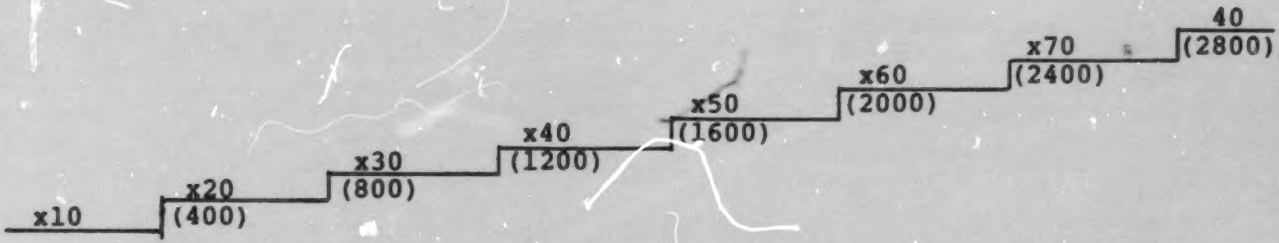
VOCABULARY

TERMS

distributive property
multiplicand
multiplier
product

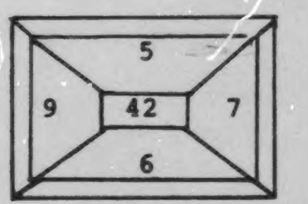
GETTING STARTED

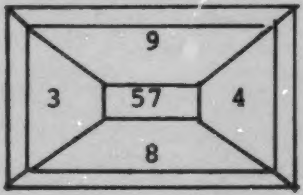
Draw the following diagram on the chalkboard.

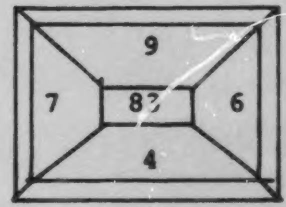

x10
x20
(400)
x30
(800)
x40
(1200)
x50
(1600)
x60
(2000)
x70
(2400)
40
(2800)

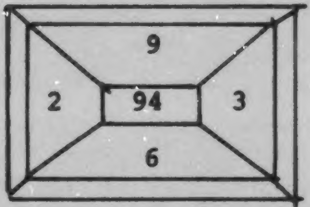
Say, "In order to open the door at the top of the stairs, multiply the numeral that appears on the door by the multiples of ten indicated on each step. Write the answer next to each multiplier." Complete the first diagram with the entire class. Draw a few diagrams on the chalkboard and instruct the students to complete them independently in their notebooks.

Review multiplication of a 2-digit number by a 1-digit number. Draw the following diagrams on the chalkboard.









GETTING STARTED cont'd

Say, "The numeral in the center box is the multiplicand. Multiply it by each of the four numerals around it. Write your product in the empty box next to the multiplier."

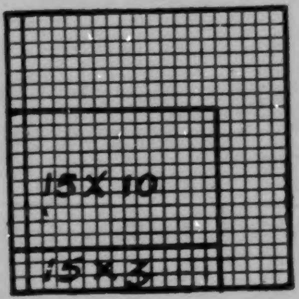
Ask the students to complete the diagrams independently in their notebooks.

5.04.02

5.04.02.01 **use the distributive property of multiplication over addition to multiply two 2-digit numbers in horizontal format**

STRATEGY 1: Say, "Thirty-one dozen eggs were delivered to a grocery store. There are 12 eggs in a dozen. How many eggs were delivered to the grocery store?" Write 31 x 12 = on the chalkboard. Say, "How many tens are in 12? (1) How many ones are in 12?" (2) Write 12 = 10 + 2 on the chalkboard. Say, "We can rewrite our example as 31 x (10 + 2)." Write (31 x 10) + (31 x 2) on the chalkboard. Ask a student to multiply 31 x 10 and another student to multiply 31 x 2. Say, "Add the two partial products to find the answer." Write on the chalkboard 310 + 62 = 372. Continue this procedure using other examples.

STRATEGY 2: Prepare 1" graph paper for demonstration, $\frac{1}{4}$" graph paper, and two different colored crayons for each student. Write the example 15 x 13 on the chalkboard. Say, "How many tens are in 13? (1) How many ones? (3) We will multiply 15 x 10 and 15 x 3 to find the product of 15 x 13." Ask the students to outline an array of 15 boxes across and 13 boxes down on their graph paper while you demonstrate on the chalkboard.



STRATEGY 2: cont'd

The rectangle drawn represents an array. Say, "This array represents the mathematical expression 15 x 13." Ask the students to count down ten boxes and draw a line across the graph in red. Say, "This represents 15 x 10. Write 15 x 10 with your red crayon in this new rectangle. How much is 15 x 10? (150) If we were to count the squares, we would have 150." Ask the students to count down three lines and underline in blue. Say, "Write 15 x 3 with your blue crayon in this new rectangle. How much is 15 x 3? (45) The product of 15 x 13 is equal to 150 + 45." Ask the students to add 150 + 45. Say, "What is the answer to this example? (195) We can count the boxes to check our answer." Continue this procedure using other examples.

5.04.02.02 **multiply a 2-digit number by a 2-digit number in vertical format**

STRATEGY 1: Read the following problem to the students.

> In the grocery store each section of a shelf can hold 24 cans. If there are 35 sections on the shelf, how many cans will the shelf hold?

Elicit from the students that this is a multiplication problem. We will multiply 35 by 24. Write the example on the chalkboard.

$$\begin{array}{rl} 35 & (30 + 5) \\ \underline{\times 24} & (20 + 4) \end{array}$$

STRATEGY 1: cont'd

Explain to the students that we will multiply the ones first and then the tens.

35		
x24		
20	1. Multiply ones x ones	4 x 5 = 20.
120	2. Multiply ones x tens	4 x 30 = 120.
100	3. Multiply tens x ones	20 x 5 = 100.
+600	4. Multiply tens x tens	20 x 30 = 600.
840	5. Add to find the product.	

The shelf can hold 840 cans.

Write the following problem on the chalkboard and repeat the procedure. Rename 36 as (30 + 6) and 24 as (20 + 4).

36 (30 + 6)
x24 (24 + 4)
24 (4 x 6)
120 (4 x 30)
120 (20 x 6)
+600 (20 x 30)
864

Repeat this procedure with the following examples.

53	84	85
x24	x22	x61

STRATEGY 2: Write the following example on the chalkboard.

65
x53

Explain to the students that when we multiply we first multiply the ones place and then the tens place.

65
x53
195
+3250
3445 Proceed with students step by step.

5.04.02

STRATEGY 1: cont'd

Step 1: 3 x 5 = 15. Write 5 in the ones place and exchange 1 in the tens place.

Step 2: 3 x 6 tens = 18 tens + 1 ten = 19 tens in the tens place.

Step 3: 5 tens x 5 = 25 tens. Write 0 in the ones place to hold the place and write 2 in the tens place and exchange the 2 tens.

Step 4: 5 tens x 6 tens = 30 tens + 2 = 32 tens. Write this in the tens place.

Step 5: Add both lines to find the product.

The product is 3,445.

Repeat this procedure with the following examples.

53	84	85	48
x24	x22	x61	x13

5.04.02.03 solve word problems related to skills learned in this module

STRATEGY 1: Prepare a chart with the following table.

Grocery Store Inventory

Item		Total
Candy	13 per pack, 17 packs	
Peaches	16 per case, 23 cases	
Magazines	28 per rack, 27 racks	
Soda	38 cans per case, 46 cases	

Ask a student to read the chart. Say, "If there are 13 candies in a pack and there are 17 packs, how can we find the total number of packs?" (Multiply)

STRATEGY 1: cont'd

Write the following on the chalkboard.

13
x17
91
+130
221 packs of candy.

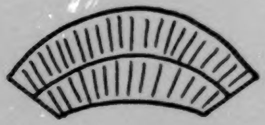
Ask a student to complete the problem on the chalkboard.

Elicit from the students that they will multiply to find the total number of peaches, magazines, and soda. Ask the students to find the products to complete the table. Review all answers on the chalkboard. Fill in the chart.

STRATEGY 2: Write the following problem on the chalkboard.

The upper deck of the football stadium has 24 sections. Each section has 42 seats. How many seats are in the entire upper deck?

Say, "The upper deck looks like this.



It has 24 sections. Each section has 42 seats.

How can we find the total number of seats?"

Elicit from the students that they must multiply to find the solution. Write the example on the chalkboard and ask a student to solve it.

24
x42
48
+960
1008 The upper deck has 1,008 seats.

P.O. 5.04.02.01

NAME:____CLASS:_________DATE:_______

Directions: Solve the following problems.

1. 53 x 24 =

   24 = 20 + 4
   then

   53 x 24 = 53 x (20 + 4)
   =(53 x 20) + (53 x 4)
   = 1060 + 212
   = 1272

2. 73 x 32 =

3. 95 x 43 =

4. 49 x 37 =

5. 93 x 56 =

P.O. 5.04.02.02

NAME:____________________ CLASS:________ DATE:________

Directions: Multiply

26
x 34
$\boxed{1}\boxed{0}\boxed{4}$ 4 x 26
$\boxed{7}\boxed{8}\boxed{0}$ 30 x 26
8 8 4 34 x 26

39
x 23
☐☐☐ 3 x 39
☐☐☐ 20 x 39
☐☐☐ 23 x 39

52
x 38
☐☐☐ 8 x 52
☐☐☐☐ 30 x 52
☐☐☐☐ 38 x 52

73
x 32
☐☐☐ 2 x 73
☐☐☐☐ 30 x 73
32 x 73

1. 47
x 36
6 x 47
______ 30 x 47

2. 88
x 45
5 x 88
______ 40 x 88

3. 77
x 64
4 x 77
______ 60 x 77

4. 52
x 45

5. 65
x 56

6. 78
x 92

P.O. 5.04.02.03

NAME:________________________ CLASS:________ DATE:_______

Directions: Solve.

1. Mr. Garcia planted 26 tomato plants in each of 34 rows. How many tomato plants did he plant?

Answer ____________

2. There are 36 crayons in one box. How many crayons are there in 32 boxes?

Answer ____________

3. There are 12 cans of milk in a box. How many cans will 54 boxes hold?

Answer ____________

4. There are 12 inches in one foot. How many inches are there in 24 feet?

Answer ____________

5. There are 36 inches in one yard. How many inches are there in 15 yards?

Answer ____________

6. There are 48 candies in one bag. How many candies will 15 bags hold?

Answer ____________

5.04.03 MULTIPLICATION OF A 3-DIGIT NUMBER BY 2-DIGIT NUMBER

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.04.03.01B multiply multiples of ten by multiples of 100 in vertical format;

e.g.,

$$\begin{array}{r}100\\ \underline{\times\ 10}\\ 1{,}000\end{array}\qquad\begin{array}{r}100\\ \underline{\times 20}\\ 2{,}000\end{array}\qquad\begin{array}{r}300\\ \underline{\times 20}\\ 6{,}000\end{array}$$

5.04.03.02B use the distributive property of multiplication to multiply a 3-digit number by a 2-digit number in horizontal format;

e.g.,

$16 \times 123 =$

$16 = 10 + 6$

Then

$$\begin{aligned}123 \times 16 &= 123 \times (10 + 6)\\ &= (123 \times 10) + (123 \times 6)\\ &= 1230 + 738\\ &= 1968\end{aligned}$$

5.04.03.03A multiply a 3-digit number by a 2-digit number in vertical format;

e.g.,

$$\begin{array}{rl}123 & \\ \underline{\times 16} & \\ 738 & (6 \times 123)\\ \underline{1230} & (10 \times 123)\\ 1968 & \end{array}$$

5.04.03.04A solve word problems related to skills learned in this module.

Lisa drives 123 miles a day. How many miles does she drive in 16 days?

$$\begin{array}{rl} 123 & \\ \underline{x16} & \\ 738 & (6 \times 123) \\ \underline{1230} & (10 \times 123) \\ 1968 & \text{miles} \end{array}$$

5.04.03

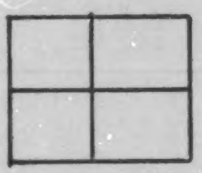
VOCABULARY

TERMS

vertical
horizontal
dimensions

GETTING STARTED

Draw a square on the chalkboard. e.g.,

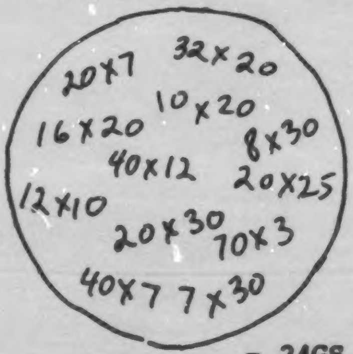


Ask the students to copy the square on their paper. Call out numbers, e.g., 4,9,6,8. Ask the students to place a number in each of the boxes. After the boxes have all been filled with a number, e.g.,

9	4
6	8

ask the students to multiply the two 2-digit numbers. The winners are those students with the greatest products. After the class has completed their multiplication allow some of the students to read their answers. Repeat the game with a new box and a new set of numbers.

Select two students to be scorekeepers. Play the game Race to the Thousands. Draw a large circle on the chalkboard. e.g.,



GETTING STARTED cont'd

Divide the class into two teams. Choose a player from Team A and ask the student to pick one of the problems from the circle, e.g., 7 x 30. Ask the student to do the example on the chalkboard. If the answer is correct (210) Team A will receive 210 points. These points are kept by the team scorekeeper. The example 7 x 30 is now crossed out. Ask a player from Team B to pick a problem and solve it at the chalkboard. If the answer is correct the product is registered by Team B's scorekeeper. Play now shifts back to Team A, and another player is chosen. Continue the game in this way for several turns. Whichever team has the most points after four turns is the winner.

5.04.03

5.04.03.01 **multiply multiples of ten by multiples of 100 in vertical format**

STRATEGY 1: Prepare two sets of cards, one set numbered from 10 through 90 in multiples of ten, and the second set from 100 through 900 in multiples of 100. Place the cards in two separate piles.

Take one card from each pile, e.g., 100 and 10 . Write $\begin{array}{r} 100 \\ \text{x } 10 \\ \hline \end{array}$ on the chalkboard. Say, "How many zeros are in 100? (2) How many zeros are in 10?" (1) Add the number of zeros and place them in the product.

e.g., $\begin{array}{r} 100 \\ \text{x } 10 \\ \hline 1000 \end{array}$

Multiply the non-zero digits (1 x 1) and place the product to the left of the zeros.

Ask a student to count the number of zeros in the product and compare it to the sum of the zeros in the factors. Say, "Are they the same? When multiplying by multiples of tens or hundreds, count the number of zeros and you will know how many zeros will be in the product. Repeat this procedure using other cards.

STRATEGY 2: Prepare one set of cards numbered from 10 through 90 in multiples of ten, and a second set numbered from 100 through 900 in multiples of 100.

Choose two cards, one from each set, e.g., 10 and 100. Say, "The first student to answer this problem becomes the leader for the next round." Write $\begin{array}{r} 100 \\ \text{x } 10 \\ \hline \end{array}$ on the chalkboard. Elicit the answer 1000. Say, "When we multiply examples such as

STRATEGY 2: cont'd

these, the quickest way to get the product is to count the number of zeros in the factors and only multiply the non-zero digit." Ask the student who arived at the answer first to become the leader and select the cards. Repeat this procedure.

5.04.03.01

use the distributive property of multiplication to multiply a 3-digit number by a 2-digit number in horizontal format

STRATEGY 1:

Write 16 x 123 = ☐ on the chalkboard. Say, "There are really two examples within this example. First, we must rename 16 as 1 ten and 6 ones. Then we multiply 123 by 6. Last we will multiply 123 by 10." Write 16 x 123 = (10 x 123) + (6 x 123) on the chalkboard. Say, "This is equal to our original example." Ask a student to multiply 123 x 6 and write the product 738 in the example.

e.g.,

$$\begin{array}{r} 123 \\ \times\ 6 \\ \hline 738 \end{array}$$

Select a student to multiply 123 x 10 and write the product 1230 under the example. e.g.,

$$\begin{array}{r} 123 \\ \times\ 10 \\ \hline 1230 \end{array}$$

Point to the two partial products 1230 + 738. Say, "Do we have our final answer? (No) How will we solve this problem?" (Add)

Ask a student to add these products.

Say, "We separated our original example into two examples. We found two partial products and then we added these products to get our final product."

Continue this procedure with other examples.

STRATEGY 2: Prepare a large piece of graph paper (16 x 123) or attach several smaller pieces. Tape it to the chalkboard. Place the example 16 x 123 on the chalkboard beside the graph paper. Say, "This graph paper is really a picture of our example. There are really two examples inside our problem (16 x 123): 10 x 123 and 6 x 123. 16 can be renamed as 10 + 6. We start by multiplying 6 x 123. The product 738 is written below."

$$\begin{array}{r}123\\ \underline{\times\ \ 6}\end{array}$$

Point to the graph paper. Say, "Since we have just multiplied 6 x 123 we can now color six rows of 123 in blue." Lightly color these six rows and write 738 in pencil over this shaded area. Return to the problem on the chalkboard (10 x 123). Say, "Since we have one zero at the end of our factor, how many zeros should we have in our product?" (One) After the zero is written down ask a student to come up and write the product below the example. Point to the graph paper and say, "We have just multiplied 10 by 123 and now we can color ten rows of 123 in yellow." Lightly color ten rows of 123, and write 1230 in pencil over the shaded area. Say, "How can I decide how many squares have been colored on my graph paper? (Add the blue and the yellow.) 1230 and 738 are our partial answer (partial products) and in order to obtain the answer we must add." Refer back to the example on the chalkboard and show that we must add 738 and 1230.

5.04.03

5.04.03.03 **multiply a 3-digit number by a 2-digit number in vertical format**

STRATEGY 1: Prepare two different colors of chalk. On the chalkboard write

$$\begin{array}{r} 123 \\ \underline{\times\ 13} \end{array}$$

Say, "There are really two examples within this example. Since 13 can be renamed as 1 ten and 3 ones (10 + 3) there are two parts to this problem. One part is the 3 ones x 123 and the other part is 1 ten x 123. We will continue to keep the example the way it is written but use our colored chalk to show the two parts of the example."

$$\begin{array}{r} \boxed{123} \\ \underline{\times\ 1\boxed{3}} \end{array}$$

"First, we will multiply 123 x 3 ones, which has been outlined in red. We will start multiplying in the ones place and then go on to the tens and hundreds." Write 369 under the example. Say, "Is this our answer?" Elicit from the students that we still have to multiply 10 x 123. Outline this part of the example in blue.

$$\begin{array}{r} \boxed{123} \\ \underline{\times\ \boxed{1}3} \end{array}$$

Say, "Since we have one zero in the factor (10), what do we know about the product?" Elicit that there must be at least one zero in the product. Select a student to come up and complete this part of the example. (1230) Say, "Is this our answer?" Elicit that it is only the partial answer. Say, "In order to obtain the final answer, add these two partial products." Ask a student to come up and add the two partial products.

STRATEGY 1: cont'd

$$\begin{array}{r} 369 \\ +1230 \\ \hline 1599 \end{array}$$

The number obtained (1599) is the final product (answer) to our original multiplication problem.

STRATEGY 2: Write $\begin{array}{r} 123 \\ \times\ 13 \\ \hline \end{array}$ on the chalkboard.

Say, "There are two examples within this one example. 13 can be renamed as 1 ten and 3 ones. Which part of our example do we work with first?" (123 x 3) Ask a student to come up and do the computation. Write the partial product 369 below the example. Write the algorithm for the partial product 369 to its right.

$$\begin{array}{rl} 123 & \\ \times\ 13 & \\ \hline 369 & (3 \times 123) \end{array}$$

Say, "Is this our answer? (No, it is only part of the answer. "Now we must multiply 1 x 123. The 1 is really 1 ten (10). If we have 1 zero at the end of our factor we must have 1 zero in our product." Ask a student to write the 0 and the result of 123 x 1 (1230). Write 10 x 123 to the right of 1230. Say, "We must add 369 and 1230 to obtain the final answer."

$$\begin{array}{rl} 123 & \\ \times\ 13 & \\ \hline 369 & (3 \times 123) \\ +1230 & (10 \times 123) \\ \hline 1599 & \end{array}$$

5.04.03

5.04.03.04 **solve word problems related to skills learned in this module**

STRATEGY 1: Prepare 16 cards each with the number 123 written on them. The cards may be made of oaktag, construction paper, or index cards. On the board write the following problem.

The White Company has 16 trucks. Each of these trucks can carry 123 boxes. What is the greatest number of boxes the White Company can carry at one time?

Distribute the 16 cards to several students. Say, "We are going to use these cards to try to act out the problem. What do you think the 16 cards represent? (The 16 trucks) Why is 123 written on each card? (Because each truck carries 123 boxes) If one truck carries 123 boxes, how can we find out how many boxes can be carried by the 16 trucks?" Elicit that we can put them together by adding. Go around the room collecting the cards and adding, e.g., 123 + 123 + 123... After gathering a few cards stop. Say, "Is there a faster way of combining equal sets? (Multiply) What must we multiply?" Elicit that we must multiply 123 by 16. Ask a student to come to the chalkboard and write the example. Selct another student to multiply.

$$\begin{array}{r} 123 \\ \underline{\times\ 16} \\ 738 \\ \underline{+1230} \\ 1968 \end{array}$$

Say, "The cards helped us to decide the best method of doing the example."

STRATEGY 2: Prepare a large chart on the chalkboard as follows.

Number of Trucks	Boxes per Truck	Total Number of Boxes

Write the following problem on the chalkboard.

> The Brown Company has 13 trucks. Each of these trucks can carry 133 boxes. What is the greatest number of boxes the Brown Company can carry at one time?

Say, "Sometimes it helps to simplify a problem. Let's see if we can simplify this problem and use our chart to solve this problem.

If the Brown Company has one truck, what numbers would you put into the chart? (1, 133, $\begin{array}{r}133\\ \times\ 1\\ \hline 133\end{array}$) Is this our answer? (No) If we continue we will find our answer." Suggest to the students that we fill in our chart with five trucks. "What numbers would we write on our chart? (5, 133, $\begin{array}{r}133\\ \times\ 1\\ \hline 133\end{array}$)

Say, "Is this our answer? (No) Why not?" (Because in our problem we have 13 trucks not five). Select a student to fill in the first two columns of the chart. Ask another student to fill in the example in column three and do the computation on the chalkboard.

The completed example should appear as below.
e.g.,

$$\begin{array}{r}133\\ \times\ 13\\ \hline 399\\ +1330\\ \hline 1729\end{array}$$

Encourage the students to simplify and use charts when solving problems on their own.

P.O. 5.04.03.01

NAME: ____________________ CLASS: ________ DATE: ________

Directions: Multiply. Use the key to break the code.

L	A	T	K	H	E	I
1,000	2,000	3,000	4,000	5,000	16,000	7,000
U	**R**	**P**	**M**	**S**	**C**	**N**
18,000	9,000	10,000	6,000	8,000	15,000	12,000

100 x 50 5,000 H	400 x 40 ____	100 x 10 ____	200 x 50 ____	
100 x 70 ____	100 x 20 ____	100 x 60 ____		
100 x 80 ____	100 x 30 ____	600 x 30 ____	300 x 50 ____	100 x 40 ____
100 x 70 ____	300 x 40 ____			
50 x 100 ____	800 x 20 ____	100 x 90 ____	200 x 80 ____	

P.O. 5.04.03.02

NAME: ________________________ CLASS: __________ DATE: ________

Directions: Match the factors in Column A with the renamed factors in Column B.

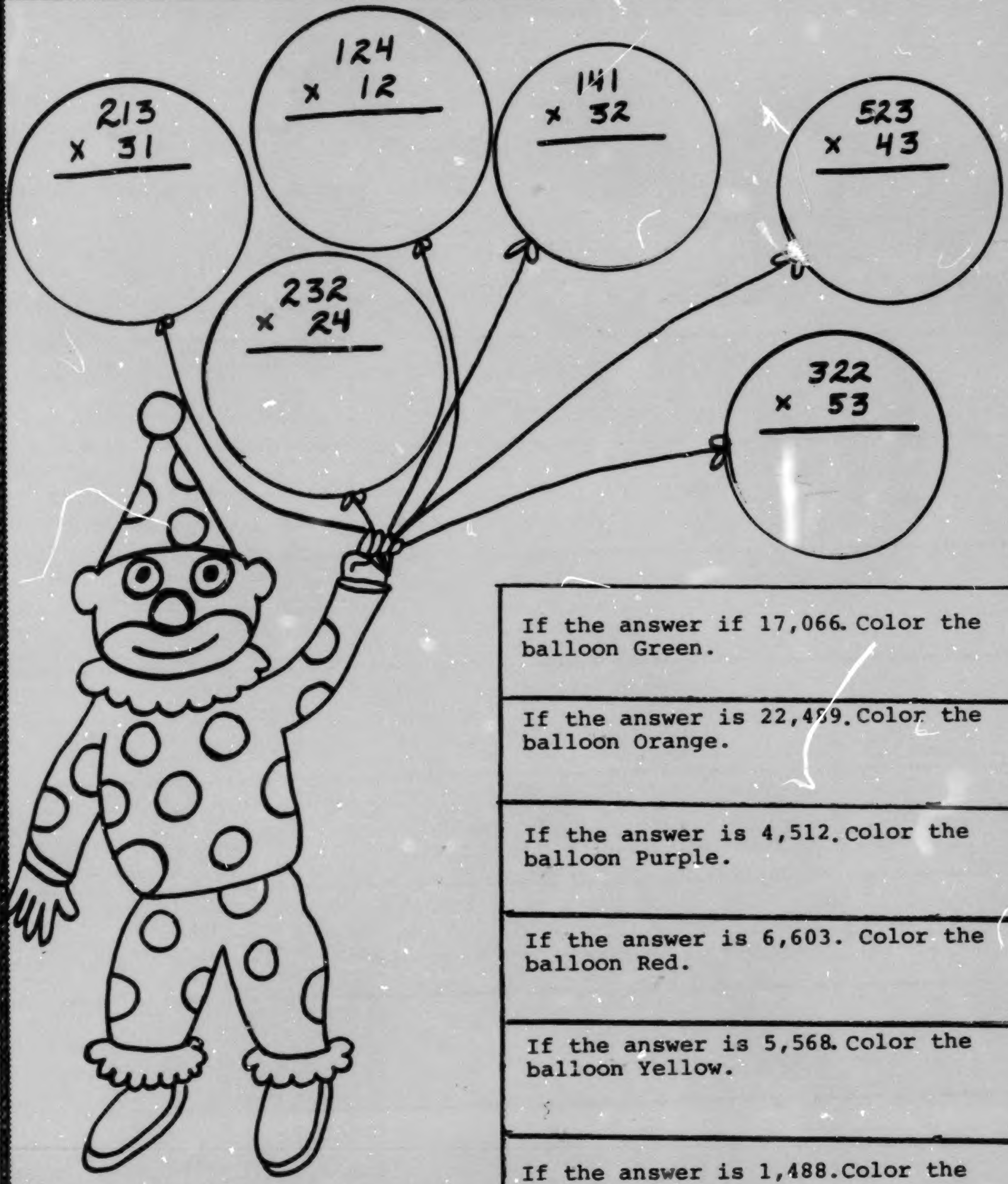
ONE CENT
ONE CENT
Make a Match

Column A	Column B
132 x 34	(428 x 30) + (428 x 7)
225 x 53	(132 x 40) + (132 x 3)
428 x 37	(225 x 50) + (225 x 3)
183 x 54	(428 x 50) + (428 x 4)
132 x 43	(132 x 30) + (132 x 4)
225 x 36	(183 x 40) + (183 x 5)
428 x 54	(225 x 30) + (225 x 6)
183 x 45	(183 x 50) + (183 x 4)

P.O. 5.04.03.03

NAME: ______________________ CLASS: ________ DATE: ________

Directions: Solve. Color in the balloons.



If the answer if 17,066. Color the balloon Green.

If the answer is 22,489. Color the balloon Orange.

If the answer is 4,512. Color the balloon Purple.

If the answer is 6,603. Color the balloon Red.

If the answer is 5,568. Color the balloon Yellow.

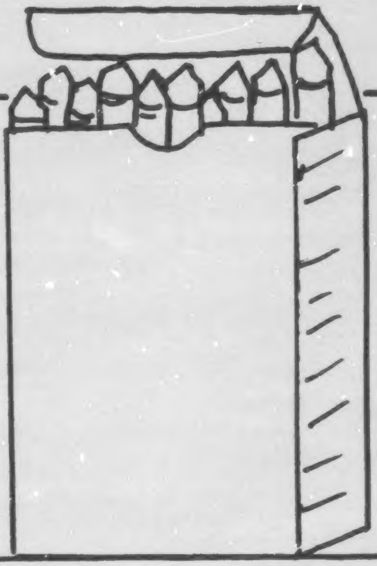
If the answer is 1,488. Color the balloon Blue.

P.O. 5.04.03.04

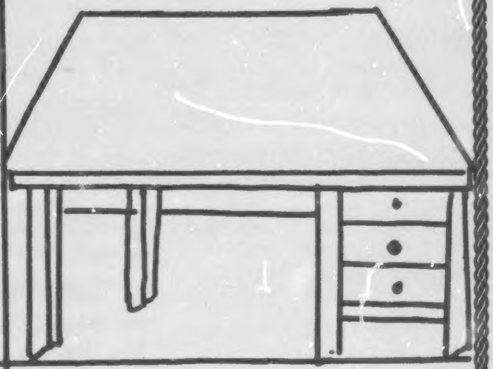
NAME: ______________________ CLASS: ________ DATE: ________

Directions: Solve. Show your work within the picture.

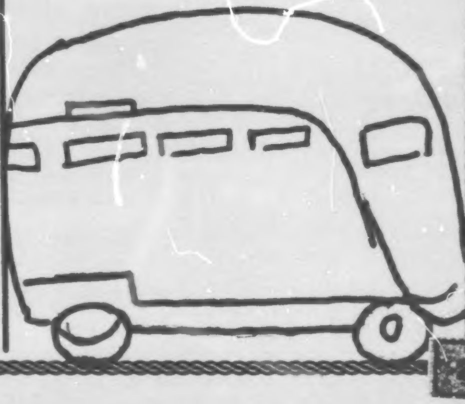
1. Your school's supply room has 242 boxes of crayons with 16 crayons in a box. How many crayons are in the supply room altogether?



2. Your school has 125 classrooms. Each classroom has 35 desks in it. How many desks are in the school building?



3. Some of the classes in your school took a trip by bus. There were 115 buses with 28 children on each. How many children went on the trip?



5.14.06 DIVISION

(ongoing)

PERFORMANCE OBJECTIVES

The student will be able to...

5.14.06.01 compute basic division facts through 144 ÷ 12;
e.g.,
$48 \div 8 = 6 \qquad 72 \div 3 = 24 \qquad 144 \div 12 = 12$

5.14.06.02 divide a 2- or 3-digit dividend by a 1-digit divisor without exchange and without a remainder.
e.g.,

$$\begin{array}{r} 43 \\ 2\overline{)86} \end{array} \qquad \begin{array}{r} 231 \\ 3\overline{)693} \end{array}$$

5.14.06

VOCABULARY

TERMS

quotient

GETTING STARTED

Distribute counting chips to each student. Ask each student to show ten chips. Say, "Separate these ten chips into groups with five chips in each group."

Write the following on the chalkboard.

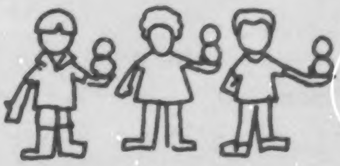
10 chips
5 in each group ☐ groups

Say, "How many groups?"

Ask a student to come to the chalkboard and fill in the box. (2)

Repeat this procedure using 12 chips and 15 chips.

Display six magnetic discs and say, "I have six oranges. I am going to give them to three students. How many oranges will each student get?" Elicit from students that we need to separate the oranges into three groups. Write the following on the chalkboard.



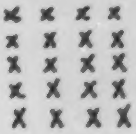
6 oranges
3 children
2 oranges each

Repeat this procedure with 12 oranges and three children.

5.14.06

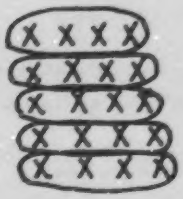
5.14.06.01 **the student will be able to compute basic division facts through 144 ÷ 12**

STRATEGY 1: Distribute graph paper to each student. Draw this array on the chalkboard.



Say, "Make x's in each box of the graph paper to copy this array. How many x's are in this array? (20) How many x's are in each row?" (4)

Say, "Place a ring around each row to find how many rows there are."



Write the equation

$20 \div 4 = 5$

Elicit from the students that we can separate or divide the rows to complete the division equation. Repeat this activity using graph paper to make arrays and division equations for an array of 24, an array of 30, an array of 100...

STRATEGY 2: You will need a hundreds chart for the chalkboard and 16 pencils.

Say, "You have 16 pencils to give away. The pencils come in sets of four, so you must give each person four pencils. How many people will get pencils?"

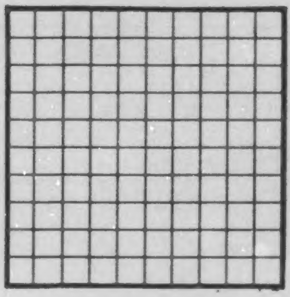
STRATEGY 2:
cont'd

$$\begin{array}{r} 16 \\ \enclose{circle}{\underline{-4}} \\ 12 \\ \enclose{circle}{\underline{-4}} \\ 8 \\ \enclose{circle}{\underline{-4}} \\ 4 \\ \enclose{circle}{\underline{-4}} \\ 0 \end{array}$$

Write 16 on the chalkboard. Give four pencils to one student and subtract from the 16. Use repeated subtractions until there are no pencils left.
Circle each four to show how many were given.

Write 16 ÷ 4 = 4
Four people received pencils.

Write 72 ÷ 8 = $\boxed{}$ on the chalkboard. Ask one student to come up to the hundreds chart and say, "Beginning at 72, keep subtracting eight until you get to 0. Write the division fact."



72 ÷ 8 = 9

Repeat this procedure with various facts.
Finish this with a flashcard fact drill.

5.14.06

5.14.06.02 **The student will be able to divide a two- or three-digit dividend by a one-digit divisor without exchange and without a remainder**

STRATAGY 1: Distribute squared materials in tens and ones to each student. Say, "Show 36 with tens and ones. These tens and ones will be shared by 3 people." Write $3\overline{)36}$.

Say, "Are there enough tens to give each child one? (Yes) How many tens did each child get?" (1 ten) Record a one in the tens place. Say, "How many tens have been shared?" (3 tens or 30) Record minus 30 to show that three tens have been shared. Say, "Subtract to find how many ones are needed in order to share. Are there enough ones to give each child? (Yes) How many ones can each child get?" (2) Record two in the ones place, and record six to show that three children shared 2 ones each. Say, "What is the total share each child received?" (1 ten and 2 ones.)

	Tens	Ones
	1	2
3)	3	6
	-3	0
		6
	-	6

Repeat this procedure with other division problems without exchange and without a remainder.

5.14.06

STRATEGY 2: Write an example on the chalkboard.

e.g.,

$4\overline{)\,84}$

Proceed with the division in a step by step manner.

```
Tens Ones
    2 1
 4 )8 4

   -8 0
      4
    - 4
```

STEP 1. Say, "Are there enough tens to be exactly divided by four?" (Yes - 2 times) Write two in the tens place and record 4x20 as 80.

STEP 2. "Subtract."

STEP 3. "How many times do we divide 4 ones by 4?" (1) Write one in the ones place and record 4x1 as four.

STEP 4. "Subtract again. Read the quotient."

Repeat this procedure with other examples.

e.g.,

$3\overline{)363}$ $4\overline{)848}$ $2\overline{)86}$ $4\overline{)488}$

P.O. 5.14.06.01

NAME: ______________________ CLASS: ________ DATE: ________

Directions: Find the quotient.

36 ÷ 6 = ☐

45 ÷ 9 = ☐

144 ÷ 12 = ☐

36 ÷ 12 = ☐

16 ÷ 2 = ☐

121 ÷ 11 = ☐

99 ÷ 11 = ☐

99 ÷ 9 = ☐

28 ÷ 4 = ☐

36 ÷ 4 = ☐

56 ÷ 7 = ☐

72 ÷ 8 = ☐

81 ÷ 9 = ☐

90 ÷ 10 = ☐

120 ÷ 10 = ☐

80 ÷ 8 = ☐

96 ÷ 12 = ☐

84 ÷ 12 = ☐

15 ÷ 3 = ☐

18 ÷ 6 = ☐

18 ÷ 3 = ☐

54 ÷ 9 = ☐

P.O. 5.14.06.02

NAME:________________________________ CLASS:__________ DATE:________

Directions: Find the quotient.

$2\,/\overline{\;86\;}$

$6\,/\overline{\;66\;}$

$4\,/\overline{\;84\;}$

$4\,/\overline{\;848\;}$

$3\,/\overline{\;393\;}$

$3\,/\overline{\;696\;}$

$3\,/\overline{\;69\;}$

$3\,/\overline{\;693\;}$

5.05.01 DIVISION OF 5- and 6-DIGIT DIVIDENDS BY 1-DIGIT DIVISORS

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.05.01.01B divide 5- and 6-digit numbers using the distributive property of division over addition by a 1-digit divisor and check; e.g.,

$4\overline{)5936}$ $5936 = 5000 + 900 + 30 + 6$

$4\overline{)5000 + 900 + 30 + 6}$

$4\overline{)4000 + 1600 + 330 + 16} = 1484$

check

$$\begin{array}{r} 1484 \\ \underline{\times \quad 4} \\ 5936 \end{array}$$

5.05.01.02A divide 5- and 6-digit numbers using repeated subtraction by a 1-digit divisor and check; e.g.,

$$\begin{array}{rcr} & & \underline{1484} \\ & & 4\overline{)5936} \\ 1000 \times 4 & \longrightarrow & \underline{-4000} \\ & & 1936 \\ 400 \times 4 & \longrightarrow & \underline{-1600} \\ & & 336 \\ 80 \times 4 & \longrightarrow & \underline{-320} \\ & & 16 \\ \underline{4 \times 4} & \longrightarrow & \underline{-16} \\ 1484 & & 0 \end{array}$$

check

$$\begin{array}{r} 1484 \\ \underline{\times \quad 4} \\ 5936 \end{array}$$

5.05.01.03A solve word problems related to skills learned in this module.

e.g.,

A woman drove 5,936 miles in four weeks. How many miles did she drive in one week?

```
                                  check

                    1484          1484
                  4)5936          x   4
1000 x 4 -----> -4000             5936
                 1936
 400 x 4 -----> -1600
                  336
  80 x 4 ----->  -320
                   16
   4 x 4 ----->   -16
                    0
```

5.05.01

VOCABULARY

TERMS

guesstimate
divisor
dividend
quotient
remainder

GETTING STARTED

Prepare two cubes numbered 0 through 5, and two cubes numbered 5 through plus zero. Blank spinners can be used if available.

Ask one student to roll all four cubes.

Ask the students to write a division example using three of the numbers rolled as a 3-digit dividend and the other number as the divisor. "0" cannot be used as the first number of the dividend or as the divisor.

The player with the smallest quotient wins the round.
e.g.,

	Numbers rolled			
Round 1	9	5	1	3

$9\overline{)135}$ $9\overline{)531}$

Prepare 10 to 15 cards with 3-digit dividends and 1-digit divisors written on them.

Ask the students to fold a sheet of paper into eight boxes.

Say, "Using tens only, guesstimate the quotient for each example. Write it on one sheet of paper. When I say go, hold up your guesstimate." e.g.,

Student Card	Guesstimate
$4\overline{)235}$	50
$9\overline{)784}$	80

244

5.05.01

5.05.01.01 **divide 5- or 6-digit numbers using the distributive property of division over addition by a 1 digit divisor and check**

STRATEGY 1: Write a 5- or 6-digit number on the chalkboard, e.g., 56,936.

Ask a student to write the number in expanded form, e.g., 50,000 + 6,000 + 900 + 30 + 6. Say, "We are going to divide 56,936 by 4 in its expanded form." Write the following on the chalkboard.

$$4\overline{)\,50{,}000 + 6{,}000 + 900 + 30 + 6}$$

Say, "If four people were going to share $50,000, how many ten thousands would each person get?" Elicit that each person would get $10,000 with $10,000 left over. Write the following on the chalkboard.

$$\begin{array}{l} 10{,}000 \\ 4\overline{)\,50{,}000 + 16{,}000 + 900 + 30 + 6} \end{array}$$

Say, "How many thousands would four people get from $16,000?" Elicit that each person would get $4,000. Write the following on the chalkboard.

$$\begin{array}{l} 10{,}000 + 4{,}000 \\ 4\overline{)\,50{,}000 + 16{,}000 + 900 + 30 + 6} \end{array}$$

Say, "How many hundreds would four people get if they shared $900?" Elicit that each person would get $200 with $100 left over. Write the following on the chalkboard.

$$\begin{array}{l} 10{,}000 + 4{,}000 + 200 \\ 4\overline{)\,50{,}000 + 16{,}000 + 900 + 130 + 6} \end{array}$$

Say, "How many tens would four people get if they shared $130?" Elicit that each person would get $30 with $10 left over. Write the following on the chalkboard.

$$\begin{array}{l} 10{,}000 + 4{,}000 + 200 + 30 \\ 4\overline{)\,50{,}000 + 16{,}000 + 900 + 130 + 16} \end{array}$$

STRATEGY 1: cont'd

Say, "How many ones would four people get if they shared $16?" Elicit that each would get $4. Write the following on the chalkboard.

$$\begin{array}{r} 10{,}000 + \ \ 4{,}000 + 200 + \ \ 30 + \ \ 4 \\ 4\overline{)\ 50{,}000 + 10{,}000 + 900 + 130 + 16} \end{array}$$

Say, "We add all of the numbers in the quotient to get our answer, $14,234. We can check by multiplying $14,234 x 4." Ask a student to perform the multiplication to show that the product and the dividend are the same.

STRATEGY 2:

Prepare toy money in the following denominations: 10,000, 1,000, 100, 10, and 1. Write the number 56,936 on the chalkboard. Ask a student to come up and use the money to rename 56,936 as 50,000 + 6,000 + 900 + 30 + 6. Say, "These bills are going to be separated into four equal groups. Select four students to represent the four groups. Write the example on the chalkboard.

$$4\overline{)50{,}000 + 6{,}000 + 900 + 30 + 6}$$

Say, "How many $10,000 bills will we be able to give each student?" Elicit that each student would get 1 ten thousand dollar bill with 1 ten thousand dollar bill left over. Show this on the chalkboard.

$$\begin{array}{l} \ \ 10{,}000 + \\ 4\overline{)50{,}000 + 16{,}000 + 900 + 30 + 6} \end{array}$$

Say, "The $10,000 left over is exchanged for 10 one thousands which we add to the $6,000 to make $16,000. How many thousand dollar bills will each of the four students receive?" (4 thousands each) Distribute four thousand dollar bills to each student and show that there are zero thousands left over. Write 4,000 in the quotient above the 16,000. The 9 hundreds are now divided by the four

5.05.01

STRATEGY 2:
cont'd

students so that each one receives 2 hundreds with 100 left over. Write 200 above the 900. The 100 is regrouped into 10 tens, and added to the 30 (3 tens) to make 130. The 13 tens are distributed equally among the 4 students so that each student receives 3 tens with 1 ten left over. Write 30 above 130. Show the students the 1 ten, exchange it for ten ones, and add the ten ones to the 6 ones, making 16 ones. Distribute the 16 ones among the four students, giving 4 ones to each student. Write the 4 above the 16.

$$\begin{array}{r} 10{,}000 + \ \ 4{,}000 + 200 + \ \ 30 + \ \ 4 \\ 4\overline{)50{,}000 + 16{,}000 + 900 + 130 + 16} \end{array}$$

Add the numbers in the quotient. (14,234)

Ask the four students to check that their combined money equals the original amount. (56,936) Say, "If we multiply 14,234 by 4 we get 56,936. Since the amount we started with is the product we got when we multiplied the quotient by 4, we know our division example is correct."

5.05.01.02 **divide 5- and 6-digit numbers using repeated subtraction by a 1-digit divisor and check**

STRATEGY 1: Write the following example on the chalkboard.

$$4\overline{)\ 85{,}936}$$

Say, "Division is a fast method of subtracting. Since the highest place value position is ten thousands, we must first find out how many ten thousands we can take out and break up into four equal sets." Elicit that we can take out 20,000 for each of the four sets. Under the dividend, show the following on the chalkboard.

STRATEGY 1:
cont'd

```
                        2
                     4)85,936
(20,000 x 4)          -80,000
                        5,936
```

Say, "We now have 5,936 left over. Can we take out any more ten thousands to share equally among the four sets? (no) But we can take out thousands. How many thousands can we take out and share equally among our four sets?" Elicit that 1,000 can be taken out for each of the four sets. Show this on the chalkboard.

```
                        21
                     4)85,936
(20,000 x 4)          -80,000
                        5,936
(1,000 x 4)            -4,000
                        1,936
```

Say, "We have 1936 left. Can we take out any more thousands?" Elicit that we cannot take out thousands, but we can take out hundreds. Say, "How many hundreds can we take out?" (4)

```
                     21,4
                  4)85,936
(20,000 x 4)       -80,000
                     5,936
(1,000 x 4)         -4,000
                     1,936
(400 x 4)           -1,600
                       336
```

Elicit that we cannot take out any more hundreds but we can regroup the 300 as 30 tens and now we have 33 tens. Say, "How many tens can we share equally among four groups?" (8) Show this on the chalkboard.

```
                     21,48
                  4)85,936
(20,000 x 4)       -80,000
                     5,936
(1,000 x 4)         -4,000
                     1,936
(400 x 4)           -1,600
                       336
(80 x 4)              -320
                        16
```

STRATEGY 1: cont'd

Say, "We can't exchange any more tens, since we only have 1 ten left, but we can regroup the ten as 10 ones. How many groups of ones do we need?" Show this on the chalkboard.

```
                         21,484
                       4)85,936
(20,000 x 4)            -80,000
                          5,936
(1,000 x 4)              -4,000
                          1,936
(400 x 4)                -1,600
                            336
(80 x 4)                   -320
                             16
(4 x 4)                     -16
                              0
```

Say, "To check our work we multiply the quotient by 4, e.g., 21,484 x 4 = 85,936. If the product is the same as the dividend, we know our answer is correct."

STRATEGY 2: Say, "We are going to divide by repeated subtraction."

Write the following problem on the chalkboard.

$4\overline{)85,936}$

Say, "Fold your paper in half vertically. Copy the example on the left side of your paper. We will use the right side to estimate how much we can take out." Select a student to estimate how many ten thousands to take out, and record his/her estimate on the chalkboard. The students can then use the right side of the paper to discover how many ten thousands they can take out, and compare their answers with the estimate. Select a student to

STRATEGY 2:
cont'd

show how many ten thousands he/she took out and how much is left.

```
                  2
                4)85,936
(20,000 x 4)     -80,000
                  5,936
```

Ask the students to estimate on the right side of their paper how many thousands can be taken out of 5,936. Select a student to write his/her answer on the chalkboard.

```
                  21
                4)85,936
(20,000 x 4)     -80,000
                  5,936
(1,000 x 4)      -4,000

                  1,936
```

Say, "Now see how many hundreds we can take out." Ask the students to use the right side to estimate how many hundreds they can take out. Select a student to show how many hundreds can be taken out on the chalkboard.

```
                      21,4
                    4)85,936
(20,000 x 4)         -80,000
                      5,936
(1,000 x 4)          -4,000
                      1,936
(400 x 4)            -1,600
                        336
```

Ask the students to estimate the number of tens to be taken out (8) and the number of ones (4). Select a student to complete the example on the chalkboard.

```
               21,484
             4)85,936
(20,000x4)   -80,000           Check:
               5,936             21,484
(1,000 x 4)  -4,000              x    4
               1,936             85,936
(400 x 4)      1,600
                 336
(80 x 4)        -320
                  16
(4 x 4)          -16
                   0
```

250

5.05.01

STRATEGY 2 cont'd Say, "To check, multiply the quotient by 4. If the product is the same as the dividend, we know we are correct."

5.05.01.03 **solve word problems related to skills learned in this module**

STRATEGY 1: Write the following problem on the chalkboard.

> Four trucks carried a total of 59,364 boxes. If they each carried the same number of boxes, how many boxes did each truck carry?

Say, "When we want to find equal amounts of a total group, what operation do we use?" (division) Write the problem on the chalkboard.

```
4)59,364
```

Say, "Before we begin, who would like to give us an estimate of the answer?" Elicit that we estimate by rounding 59,364 to 59,000 and dividing by 4. 59 ÷ 4 = 14, so 59,000 ÷ 4 = 14,000. Record the estimate of 14,000 on the chalkboard. Next, find the quotient through repeated subtraction.

```
   14,841
 4)59,364
  -40,000
   19,364
  -16,000
    3,364
   -3,200
      164
     -160
        4
        4
        0
```

STRATEGY 1: cont'd Each truck carried 14,481 boxes. Compare this quotient with the estimate.
Repeat this procedure with similar word problems.

STRATEGY 2: Write the following problem on the chalkboard.

> Mr. Jones had 62, 895 packages of paper to distribute throughout the school. He asked 5 fifth grade girls to do the job. Each girl delivered the same amount of packages. How many packages did each girl deliver?

Explain to the students that the word "each" is a key word that tells us to divide. Write the problem on the chalkboard.

```
 5)62,895
```

Elicit an estimate from the students and write it on the chalkboard. (Estimate by rounding 62,895 to 63,000 and divide by 5, 12,000.) Next, divide using repeated subtraction.

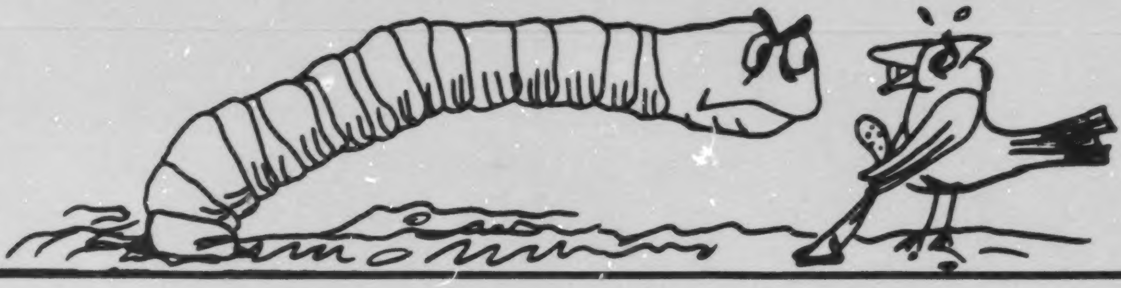
```
   12,579
 5)62,895
  -50,000
   12,895
   10,000
    2,895
   -2,500
      395
     -350
       45
      -45
```

Each girl delivered 12,579 packages. Compare this quotient with the estimate.

P.O. 5.05.01.01

NAME: ____________________ CLASS: ________ DATE: ________

Solve the following problems. Do you see a pattern in the quotients?



(1) $2\overline{)20,000 + 9,000 + 600 + 90 + 0}$ Check

(2) $3\overline{)30,000 + 7,000 + 0 + 30 + 5}$ Check

(3) $2\overline{)40,000 + 6,000 + 900 + 10 + 12}$ Check

(4) Will these examples give the same answer? Why ?

$4\overline{)85712}$

$4\overline{)80,000 + 5,000 + 700 + 10 + 2}$

Check

P.O. 5.05.01.02

NAME: ______________________ CLASS: ________ DATE: ________

Directions: Find the quotients and check. Use repeated subtraction.

```
      14,841
 4) 59,364        Check     14,841
   -40,000                     x  4
    19,364                  59,364
   -16,000
     3,364
     3,200
       164
      -160
         4
        -4
```

Find the quotient and Check.

$5\overline{)\,52{,}685}$	$6\overline{)\,636{,}876}$	$4\overline{)\,86{,}344}$

P.O. 5.05.01.03

NAME: ______________________ CLASS: __________ DATE: ________

Directions: Solve the problems. Look for the answer below. Write the letter of the problem above the answer. The message will tell you if your answers are correct.

R

A school district has 45,424 pencils which must be shared by 4 schools. How many pencils will each school receive?

G

There are 55,775 bars of candy. If they are packed in 5 boxes - How many bars are in each box?

T

67,530 baseball cards are to be shared by 6 boys - how many cards will each boy get?

H

A warehouse has 34,371 peaches which must be shared evenly among 3 supermarkets. How many peaches will each supermarket receive?

I

A boy has 34,752 marbles which are to be shared by his 3 frends. How many mables will each friend receive?

______	______	______	______	______
11,356	11,584	11,151	11,457	11,255

237

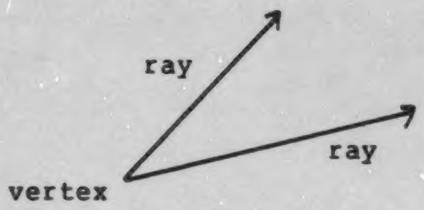
5.09.02 ANGLES

(1 lesson)

PERFORMANCE OBJECTIVES

The student will be able to...

5.09.02.01B identify an angle;
e.g.,



5.09.02.02B name angles using the angle symbol.
e.g.,

∢A
∢BAC
∢CAB

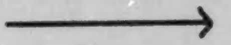
5.09.02

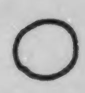
VOCABULARY

TERMS

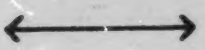
GETTING STARTED

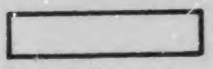
Draw the following on the chalkboard. Next to each geometric figure, write the name of a shape.

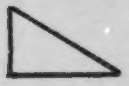
1. 

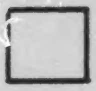
2. 

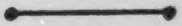
3.

4. 

5. 

6. 

7. 

8. 

Square

Rectangle

Point

Triangle

Segment

Ray

Line

Circle

Ask students to match the drawing with the word.

Point to different objects in the room, e.g., chalkboard, door, window, book, coin, and elicit the names of the geometric shapes that these objects represent.

5.09.02

5.09.02.01 **identify an angle**

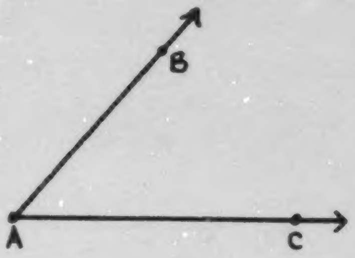
STRATEGY 1: Say, "Tillie the Turtle wanted to spend her life walking. She started at point A."

Draw a point on the chalkboard and label it A.

. A

Say, "She went from point A to point B, and kept on going in a straight line." Draw point B on the chalkboard. Join point A with point B and extend the line.

Say, "The path Tillie took is a ray. It has an end point, A (point to A on the chalkboard), and goes on and on in one direction.



Mickey the mouse also wanted to walk. He, too, started at point A. However, he went from point A to point C, and kept on going."

Draw point C on the chalkboard, and join point A and point C and extend the ray.

Say, "Mickey's path is also a ray. He went on ray AC. Two rays that start at the same point from an angle, the point where the rays meet, is called the vertex. We can say that an angle consists of two rays having a common end point called the vertex."

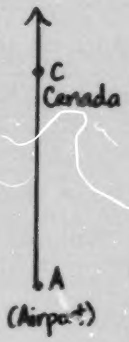
STRATEGY 2: Ask the students to have their notebooks open. Say, "We are at an airport in New York City. One of our friends, Juan, is flying off to Canada."

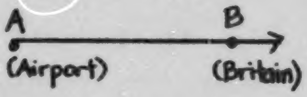
Draw two points, A and C, on the chalkboard and ask the students to do this in their notebooks. Say, "The plane travels from A (airport) and goes to C (Canada), drops Juan off, and keeps on flying."

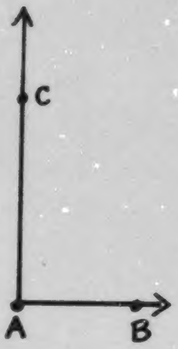
STRATEGY 2: cont'd

Ask the students to draw a line joining A and C, and to extend the line. Say, "The path the plane took is a ray. It has an end point, A, and goes on and on in one direction. Our other friend, Rosa, also took off at the airport. However, her plane went to England. Her flight is shown by ray AB. After dropping her at B, the plane kept on flying in a straight line."

Draw the ray AB on the chalkboard and ask the students to do this at their seats.







Say, "Both our passenger friends started at the same point, A. One of them travelled on ray AC and the other on ray AB. Two rays that start at the same point form an angle. We can say that an angle consists of two rays having a common end point. The common end point is called the vertex." Ask the students to draw other angles, labeling the rays and the vertex.

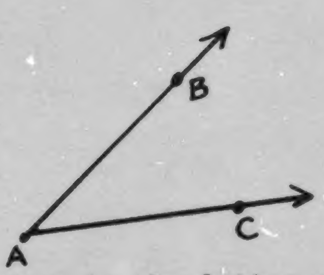
5.09.02.02 **name angles using the angle symbol**

STRATEGY 1: Draw an angle on the chalkboard. e.g.,

5.09.02

STRATEGY 1: cont'd

Say, "What is this figure called?" Elicit that it is any angle. Say, "Every angle has a name. The name we give to an angle is the same as the letter on the vertex of an angle. What is the letter on the vertex of the angle drawn?" Elicit the letter is A. Say, "Therefore, the name of this angle is A. We call it angle A. The symbol for an angle is ∡ ." Draw the symbol on the chalkboard. "We write this angle as ∡ A."



Write the symbol ∡ A on the chalkboard. Point to the symbol ∡ on the chalkboard and say, "We read ∡ A as angle A."

Place your finger on point B, and move it along the line to point A, and then continue moving it up to point C. At the same time say, "We can also call this angle, angle BAC."

Write the angle on the chalkboard, ∡ BAC.

Point your finger at C and work backwards to B. Say, "We can also call this angle, angle CAB.

Write the angle on the chalkboard, ∡ CAB.

Say, "There are the three names for this angle. What are they?" Elicit the correct answers from the students.

e.g.,

∡ A, ∡ BAC, ∡ CAB

STRATEGY 2: On the chalkboard, draw an angle without any letters. Ask the students to draw the angle in their notebooks. Say, "We want to give this angle a name. In order to do so we need to first have the names of the two rays which form this angle. Let us name the rays AB and AC." Label the angle on

STRATEGY 2:
cont'd

the chalkboard with the letters A, B, C and ask the students to do the same. Say, "Since an angle looks like this (point to the angle on the chalkboard) we use a symbol to show an angle, ∠." Write ∠ on the chalkboard. Say, "If we wanted to give this angle a name, what should it be? We could call this angle ∠A or ∠B or ∠C. Does it make more sense to call this angle ∠A rather than ∠B or ∠C? Why?"

Elicit from the students that we call this angle ∠A because that is the point where the two rays meet. It does not make sense to call this angle ∠C because the two rays do not meet there. The name of an angle is the point where the two rays meet. Hence, ∠A is the correct name for this angle.

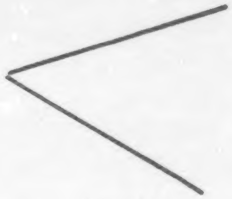
Move your finger along BAC and say, "We can also call this angle ∠BAC." Move your finger along CAB and say, "We can also call this angle ∠CAB. When we name the angle this way, the letter on the vertex must always be the middle letter. Is the letter on the vertex the middle letter in the name of the two angles?" (yes)

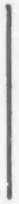
Draw a few angles on the chalkboard and ask several students to come to the chalkboard and write the names for the angle while the other students work at their seats.

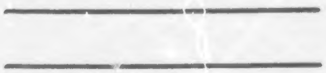
P.O. 5.09.02.01

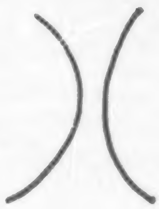
NAME: ______________________ CLASS: _______ DATE: _______

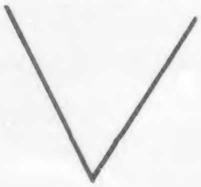
Directions: Identify which of the following figures are angles by circling the correct letter. Label the rays and the vertex.

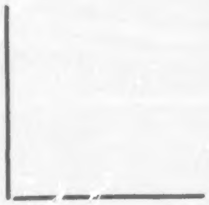
A


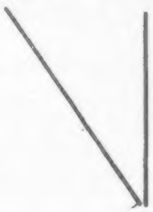
B


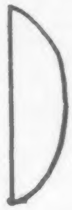
C


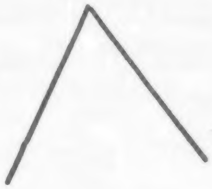
D


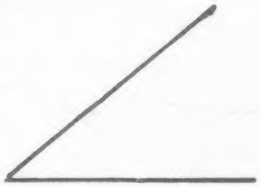
E


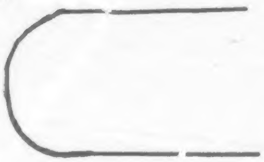
F


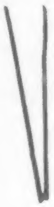
G


H


I


J


K


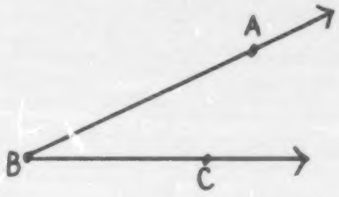
L


Angles are: A B C D E F G H I J K L

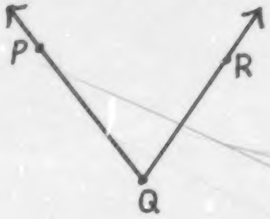
P.O. 5.09.02.02

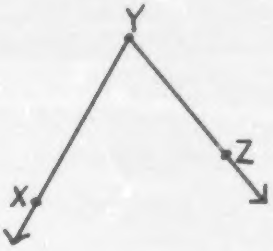
NAME:____________________ CLASS:________ DATE:_______

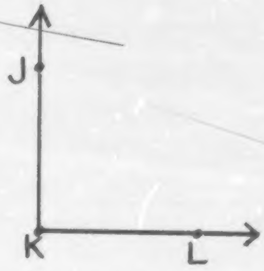
Directions: A. a) Use three letters to name each angle.
b) Name the angle at the vertex.
B. Use three letters to name each angle. C. Answer the questions.

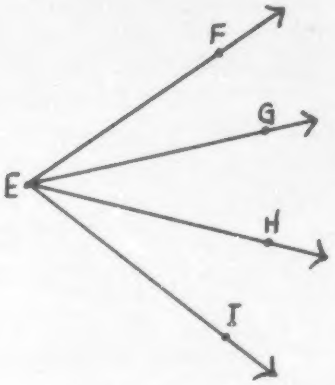


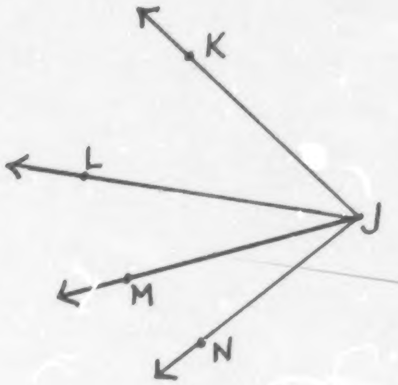
∡ ABC
∡ CBA
∡ B

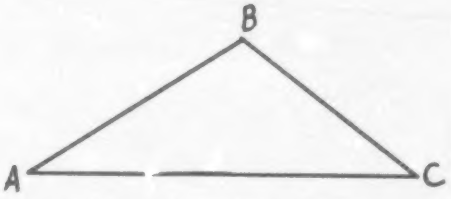












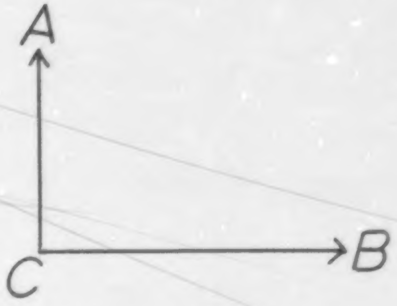
Angle B is called the angle of the triangle and is written as ∡B. Name the other other angles of the triangle.

P.O. 5.09.02.02

NAME: ______________________________ CLASS: __________ DATE: ________

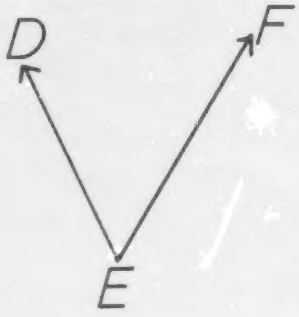
Directions: Name each angle using the symbol ∢ .

①



∢ACB

②



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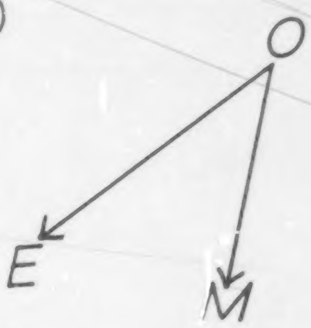
③



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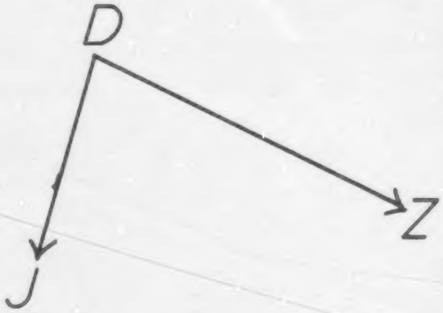

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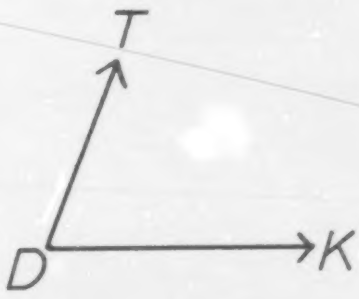
⑤



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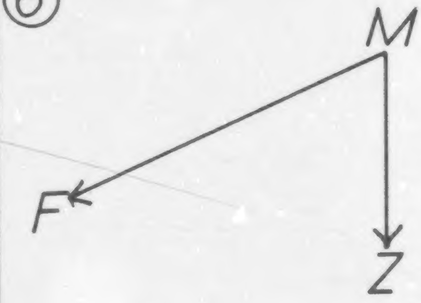
⑥



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Unit 24

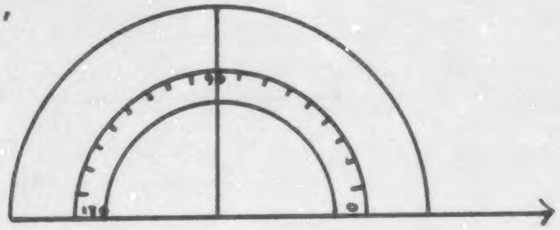
5.09.03 ANGLE MEASUREMENT

(1 lesson)

PERFORMANCE OBJECTIVES

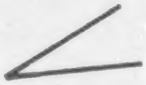
The student will be able to...

5.09.03.01B measure and/or construct right angles using a protractor;
e.g.,



90° = rt <

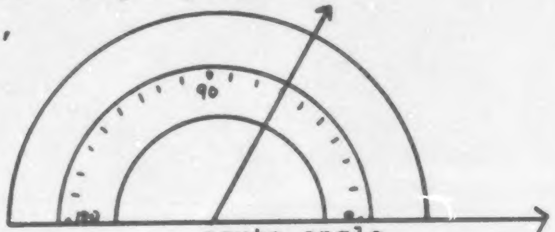
5.09.03.02B identify acute and obtuse angles;
e.g.,



acute angle

obtuse angle

5.09.03.03B measure and/or construct acute and obtuse angles using a protractor.
e.g.,



acute angle

5.09.03

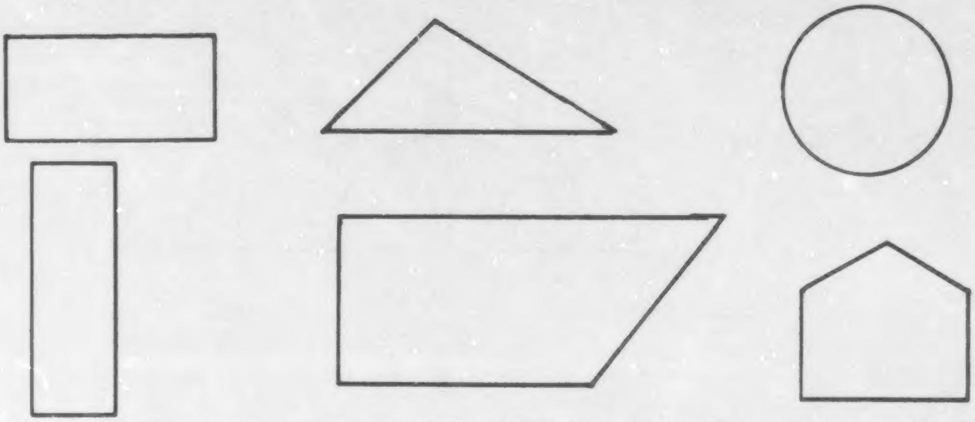
VOCABULARY

TERMS

protractor
right angle
acute angle
obtuse angle
degree

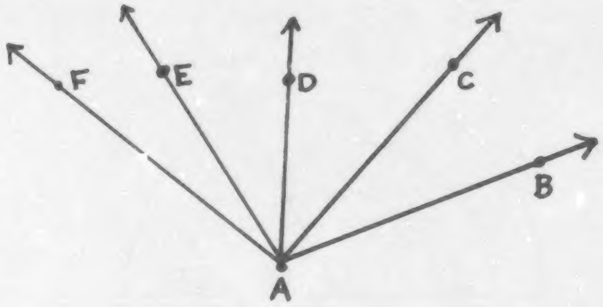
GETTING STARTED

Draw the following figures on the chalkboard.



Ask a student to come to the chalkboard and next to each figure write the number of angles it contains.

Draw the following diagram on the chalkboard.



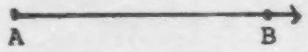
GETTING STARTED cont'd

Ask the students to copy the figure in their notebooks. Say, "Can you name all the different angles in this figure?" Point to the figure and say, "One of the angles is ∡ BAC. Name the other angles in the figure." Ask the students to work individually for a few minutes at their desks. Say, "How many angles have you named?" Elicit responses and ask the student who had determined the greatest number of angles to come to the chalkboard and name them. If he/she is unable to name all ten angles complete the naming of angles yourself. The complete set of angles is: ∡ BAC, ∡ CAD, ∡ DAE, ∡ EAF, ∡ BAD, ∡ CAE, ∡ DAF, ∡ BAF, ∡ CAF.

5.09.03

5.09.03.01 **measure and/or construct right angles using a protractor**

STRATEGY 1: Prepare a set of protractors. Draw ray AB on the chalkboard, as follows, and ask the students to do the same on a sheet of paper at their desks.



Say, "We will construct a right angle using our protractors." Give one protractor to each student.

Say, "How many degrees are there in a right angle?" Elicit that the answer is 90°.

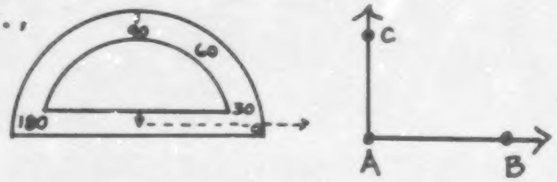
Say, "Place your protractor on the paper so that the tip of the arrow in the middle of your protractor lies exactly on point A, the origin of the ray, and the zero mark falls on ray AB." Walk around and check the students work to make sure that the protractors are placed correctly.

Say, "Look at your protractor. You will see that there are two rows of numbers. The inner row has numbers from zero to 180 going from right to left. Starting from zero follow the numbers until you reach 90. Make a point at the edge of the protractor above 90 and label it C."

Walk around and check to see that the students are drawing correctly.

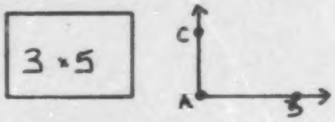
Say, "Remove your protractor and draw the ray AC. We have now constructed a right angle. Its name is angle CAB and it contains 90°."

e.g.,



5.09.03

STRATEGY 2: Give a 3x5 index card to each student. Ask the students to place the index card on their papers and trace the outline of two sides of the card so that a right angle is constructed.



Say, "You have just constructed an angle. We want to measure this angle. The tool we will use to measure the angle is called a protractor." Write the word "protractor" on the chalkboard and distribute a protractor to each student.

Say, "Place your protractor on the angle so that the tip of the arrow in the middle of your protractor lies exactly in the vertex of the angle, and the zero mark falls on the horizontal ray." Walk around and check the students' work to make sure that the protractors are placed correctly.

Say, "Look at your protractors. What is the number that falls on top of the vertical ray?" Elicit that the answer is 90°.

Say, "We measured the angle and found it was 90°. Since a right angle has 90°, we know we constructed a right angle."

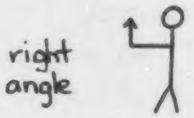
5.09.03.02 **identify acute and obtuse angles**

STRATEGY 1: Ask a student to stand up in front of the room and extend his/her arms to show a right angle. Draw a stick figure with an arm at a right angle, as below, and write right angle next to it. Elicit from students that a right angle has 90°. Say,

STRATEGY 1: cont'd

"Make the right angle smaller. The angle you have just made is called an acute angle and it is smaller than a right angle." Draw a second stick figure, this one with an arm at an acute angle, and write acute next to it.

1.



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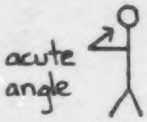

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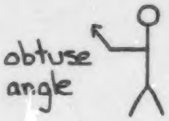
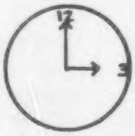
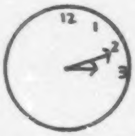


Ask the student to extend his/her arm to make a right angle and then ask him/her to make it larger. Say, "An angle larger than a right angle is called an obtuse angle." Draw a third stick figure with an arm at an obtuse angle, as above, and write obtuse angle next to it. Ask the students to identify angles that are formed by objects in the room, with an emphasis on acute and obtuse angles. Ask them to locate the vertex and sides of each angle.

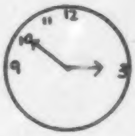
STRATEGY 2: Place a large model clock in front of the class room. Place the hour hand at 3 and the minute hand at 12.



1)



2)



3)

Say, "What angle is formed at 3 o'clock?" Elicit from the students that it is a right angle. Move the minute hand to the 2 (3:10). Elicit from the students that the angle now shown on the clock is smaller than a right angle. Say, "This is called an acute angle and it is smaller than a right angle." Move the minute hand to the 10 (3:50).

STRATEGY 2: cont'd

Elicit from the students that this angle is larger than a right angle. Say, "This is an obtuse angle and it is larger than a right angle." Repeat this procedure, using the clock to form right, acute, and obtuse angles. Ask students to identify the angles presented. Place emphasis on acute and obtuse angles.

5.09.03.03 **measure and/or construct acute and obtuse angles using a protractor**

STRATEGY 1: Draw a ray AB on the chalkboard and ask the students to do the same on a sheet of paper at their desks.

Say, "We will construct and measure acute and obtuse angles using a protractor."

Give one protractor to each student.

Say, "What is an acute angle?" Elicit that an acute angle is an angle which is less than 90°.

Say, "What is an obtuse angle?" Elicit that an obtuse angle is an angle which is greater than 90° but less than 180°.

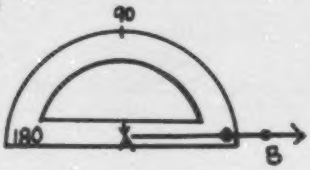
Say, "Place your protractors on the paper so that the tip of the arrow in the middle of your protractor lies exactly on point A, the origin of the ray, and the zero mark falls on ray AB." Walk around and check the students work to make sure that the protractors are placed correctly.

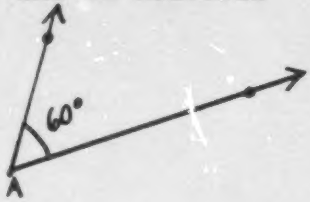
STRATEGY 1: cont'd

Say, "We are going to construct an acute angle. The angle we are making will measure 60°. Find 60° on your protractor, make a point there, and name it C. Join point A and point C." Walk around and check to see that the students are doing their work correctly.

Say, "We have just constructed an acute angle. The name of this angle is angle BAC, and it measures 60°."

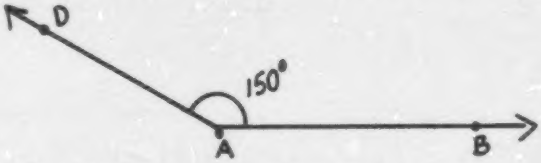
e.g.,





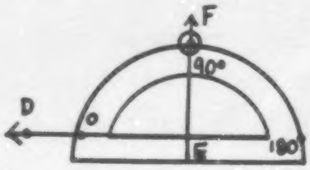
Say, "We are now going to construct an obtuse angle. This angle will contain 150°." Ask the students to draw a new angle, angle BAD, containing 150° following the above procedure.

e.g.,



STRATEGY 2: Give each student a protractor. Say, "This is a tool for measuring angles." Discuss both scales, one showing clockwise rotation, the other showing counterclockwise rotation. Say, "Half a rotation is 180°." Ask students to locate various amounts of rotation from either 0° mark. Use a chalkboard protractor or clear plastic one on the overhead projector. Demonstrate measuring a right angle. Stress locating the center mark on the vertex and a 0° mark on one side. Measure the angle using each 0° mark.

e.g.,

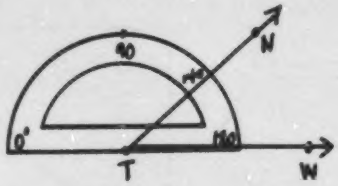


STRATEGY 2: cont'd

Then demonstrate with acute and obtuse angles on the chalkboard. Say, "The 0° mark is placed on the side of the angle." Measure both ways to show that the measure of the angle is the same using either scale. Ask students to draw angles and measure them. Students may need to copy the angles and extend the rays before they can use their protractors.

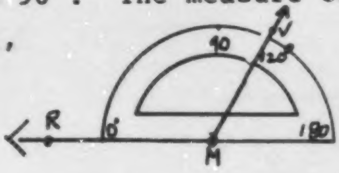
Say, "To measure an angle, place the center mark of the protractor on the vertex of the angle. One side of the angle must touch a zero mark."

e.g.,



Say, "Angle NTW is acute. Its measure must be less than 90°. The measure of angle NTW is 40°."

e.g.,



Say, "Angle RMV is obtuse. Its measurement must be greater than 90°. The measure of angle RMV is 120°."

P.O. 5.09.03.01

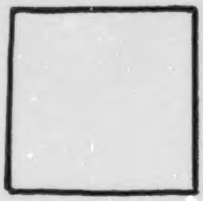
NAME:____CLASS:__________DATE:________

Directions: A. Measure the angles in each Figure and determine the number of right angles.

B. Draw right angles on points A through F. Use a protractor.

A.

1



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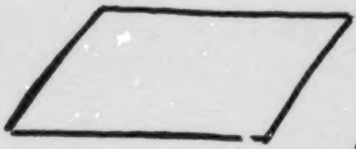

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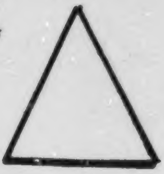

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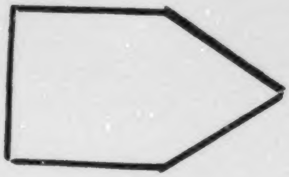

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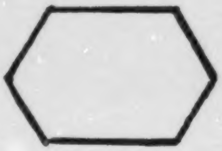

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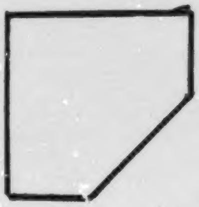

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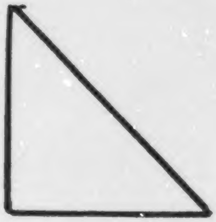

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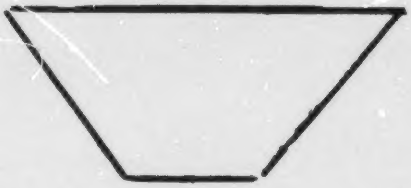

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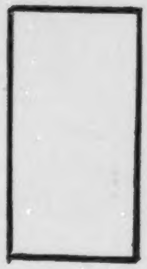


Figure 1 ____________

2 ____________

3 ____________

4 ____________

5 ____________

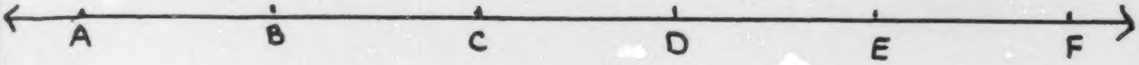
6 ____________

7 ____________

8 ____________

9 ____________

B.

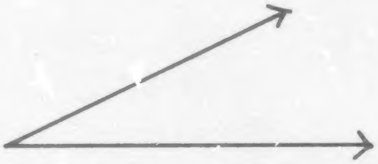


P.O. 5.09.03.02

NAME: ______________________ CLASS: __________ DATE: ________

Directions: Label each angle acute or obtuse.

①



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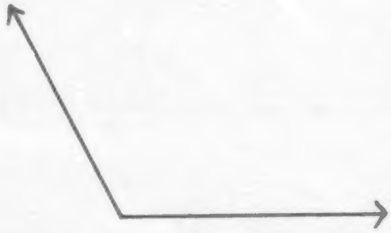
②



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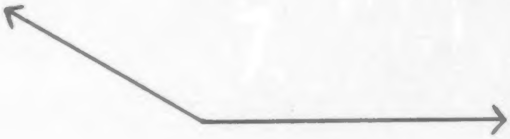
③



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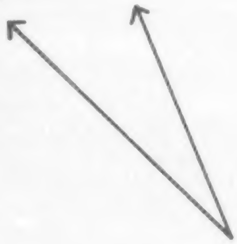
④



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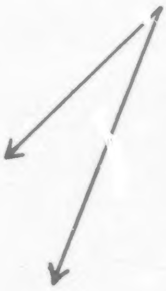
⑤



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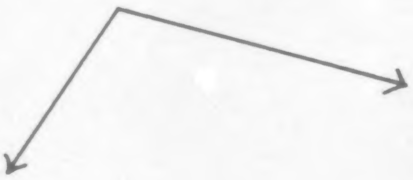
⑥



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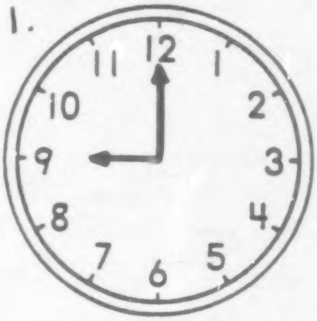
P.O. 5.09.03.02

NAME: ______________________ CLASS: __________ DATE: ________

Directions: Identify right, acute and obtuse angles.

right, acute, or obtuse angles

1.



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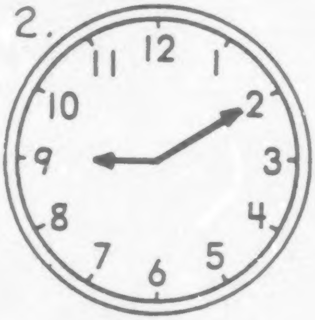
2.



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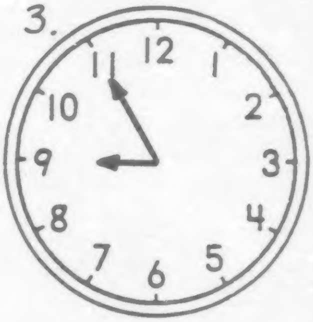
3.



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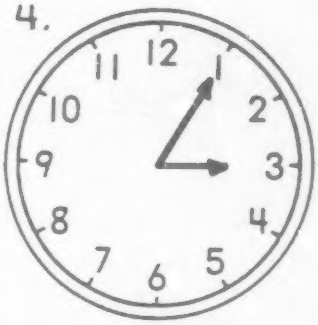

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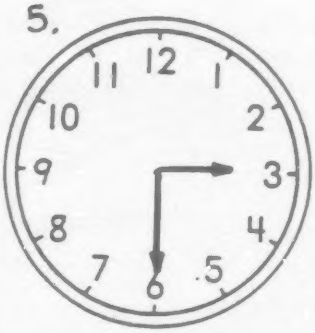

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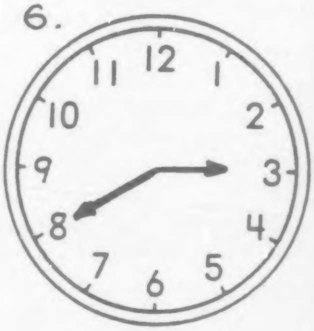

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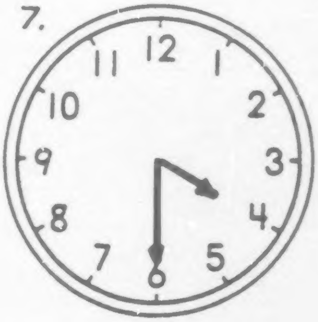

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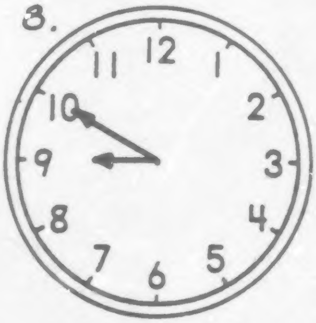

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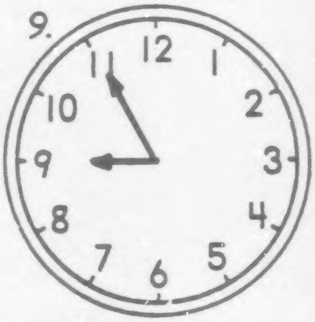

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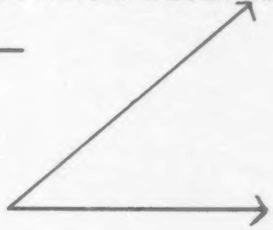
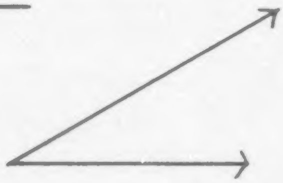
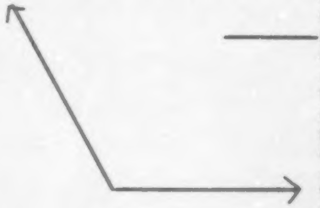
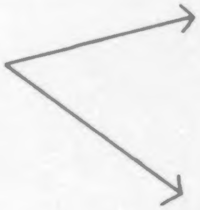
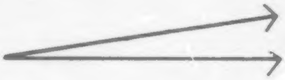
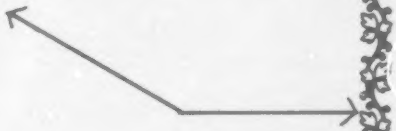
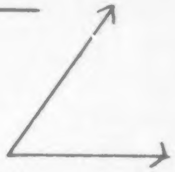
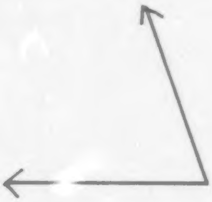
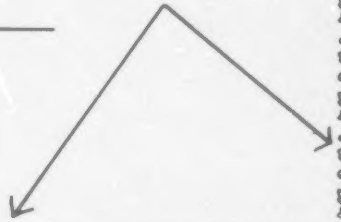
258

P.O. 5.09.03.03

NAME:________________________________CLASS:________DATE:_______

Directions: A. Measure each angle. Write the number of degrees inside the angle. Label the angle acute or obtuse.
B. Using a protractor, construct each angle indicated in the box.

____ 	____ 	____ 
____ 	____ 	____ 
____ 	____ 	____ 
30°	45°	90°
120°	150°	180°

5.10.03 PERIMETER

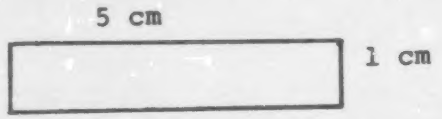
(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.10.03.01A compute the perimeter;

e.g.,



P = (5+5) + (1 + 1)
P = 10 + 2
P = 12 cm

5.10.03.02A solve word problems related to skills learned in this module.

e.g.,

We wanted to put a frame around a rectangular picture. The picture is 16 cm long and 13 cm wide. How much framing will we need?

P = (2 x 16) + (2 x 13)
P = 32 + 26
P = 58 cm

5.10.03

VOCABULARY

TERMS

perimeter

GETTING STARTED

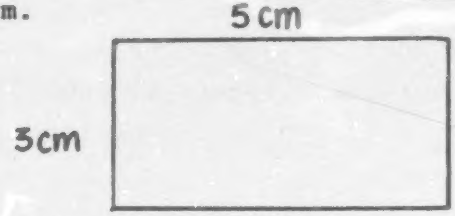
Draw polygons on the chalkboard, e.g., triangle, rectangle, square, and odd shaped figures. Ask the students to identify the figures and use a meter stick or a ruler to determine the length of each side.

Distribute a geo-board and a rubber band to each student. If there are not enough geo-boards for each student ask the students to work in groups of three. Say, "Use your rubber band to make a rectangle that touches ten nails. We are not concerned with the interior part of the rectangle but only with the outer nails that are touched by the rubber band." After several minutes select some students to show their models. Ask the students to construct other figures.

5.10.03

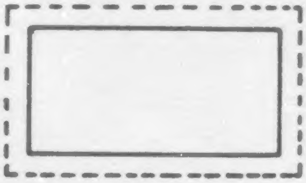
5.10.03.01 **compute the perimeter**

STRATEGY 1: Prepare a large piece of string. Draw a large rectangle on the chalkboard representing 5cm by 3cm.



Say, "We are going to find the distance around the rectangle. The distance around the rectangle is called the perimeter."

Select a student to come to the chalkboard. Give the student a piece of string and ask the students to tape it around the figure, as follows.



(the dotted line represents the string)

Say, "Knot the string to show how much string was used to go around the rectangle." Ask the student to measure the string up to the knot using a centimeter ruler. Say, "How much string did you use? The length of the string tells us the distance around the rectangle. There is a faster way to find the perimeter. We add length plus width plus length plus width. Using the rectangle drawn on the chalkboard we would add 5 + 3 + 5 + 3." Select a student to add. Say, "The perimeter of this rectangle is 16cm."

5.10.03

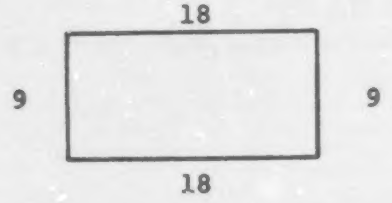
STRATEGY 2: Prepare graph paper for the class and a large piece of graph paper for demonstration. Tape the large piece of graph paper to the chalkboard. Distribute a piece of graph paper to each student. Say, "Outline a rectangle three boxes down and seven boxes across on the graph paper. We are going to find the perimeter of this rectangle. Let's count the squares around the rectangle." Ask the students to count the squares outside the figure. Select a student to give the answer. (20) Say, "how did we obtain the answer 20?" Elicit that we added 7 + 3 + 7 + 3. Say, "It is faster to add length plus width plus length plus width to find the perimeter of a rectangle."

5.10.13.02 **solve word problems relating to skills learned in this module**

STRATEGY 1: Write the following problem on the chalkboard.

> John wanted to put a fence around a rectangular garden plot. The plot is 18 feet long and 9 feet wide. How much fencing will he need?

Encourage the students to suggest different ways to solve the problem. Ask a student to come to the chalkboard and draw a rectangle, labeling the sides correctly.



STRATEGY 1: cont'd

Say, "If we are putting a fence around the garden what are we finding?" Elicit that we are finding the perimeter. Say, "How do we find the perimeter?" Elicit that we add length plus width plus plus length plus width. Select a student to write the example and add. Say, "We would need 54 feet of fencing."

STRATEGY 2:

Prepare geo-boards and rubber bands. Distribute the geo-boards to each student. Write the following problem on the chalkboard.

> An ant crawls around a rectangular block. The block is two pegs wide and three pegs long. How far does the ant crawl?

Ask each student to use his/her rubber band to make a block on the geo board which is two pegs wide and three pegs long. Select a student to come up before the class and demonstrate what the ant did, using his/her geo-board.

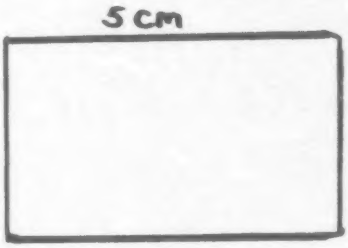
Say, "Trace your finger around the outside of the rubber band. If we are talking about the outside or exterior region, what are we finding?" Elicit that we are finding a perimeter. Say, "How do we find the perimeter?" Elicit that we add length plus width plus length plus width. Select a student to find the perimeter.

Say, "If you go back to your geo-boards and beginning with the upper right hand corner nail count the nails on the rubber band, you will obtain the same answer."

P.O. 5.10.03.01

NAME:______________________ CLASS:__________ DATE:________

Directions: 1. Measure each side to the nearest cm.
2. Write each length in the blank.
3. Compute the perimeter.



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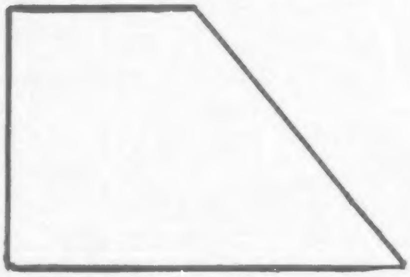

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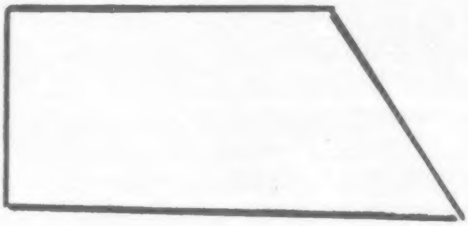

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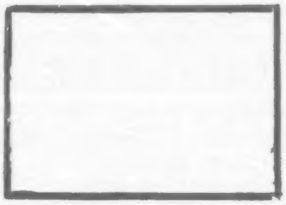

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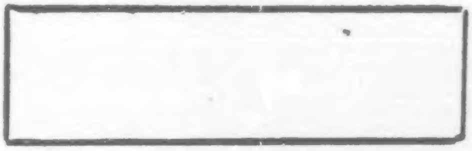

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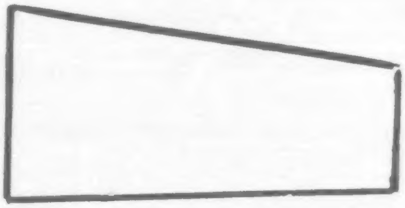

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P.O. 5.10.03.02

NAME:____________________ CLASS:________ DATE:_______

Directions: Solve the problems.

Answer the following questions.

(1) A field is 300 yards long and 150 yards wide. If John ran around it once, how far did he run?

(2) How could you find the perimeter of the classroom? (If the room has tiled floor it might help)

(3) John says he can figure - out the perimeter of any rectangle by just knowing the length and width (2 of the 4 sides) Is he right?

(4) You are in the business of putting up fences. One day you get two possible jobs of which you can only take one. Mr White wants a fence around his yard which measures 30 ft by 50 ft. Mr Black wants a fence around his home which measure 40ft by 70ft. Which job is the one you will take? Why?

TABLE OF SYMBOLS

DEFINITIONS	SYMBOL	DEFINITIONS	SYMBOL
plus; add; positive	+	line	⟷
minus; subtract; negative	-	ray	⟶
plus or minus	+ or -	perpendicular lines	⊥
times; multiply	· or X	parallel lines	∥
divide	÷	degree	°
divide	$\overline{)\quad}$	equals	=
square root	$\sqrt{\quad}$	is not equal to	≠
cube root	$\sqrt[3]{\quad}$	is less than	<
angle	∡	is greater than	>
between two numerals or letters at the end of a series or sequence; and so on	...	encloses a set when numbers are included: empty set when empty	{ }
		subset	⊂
triangle	△	intersection	∩
rectangle	▭	union; join	∪
parallelogram	▱	percent	%
circle	⊙	foot, minute	'
line segment (as $\overline{AB}$)	—	inch, second	"

METRIC TABLE

PREFIX	VALUE	LENGTH	CAPACITY	WEIGHT (MASS)
KILO	1000	kilometer* (km)	kiloliter (kl)	kilogram* (kg)
HECTO	100	hectometer (hm)	hectoliter (hl)	hectogram (hg)
DEKA	10	dekameter (dam)	dekaliter (dal)	dekagram (dag)
	1	meter* (m)	liter* (l)	gram* (g)
DECI	$\frac{1}{10}$ or .10	decimeter (dm)	deciliter (dl)	decigram (dg)
CENTI	$\frac{1}{100}$ or .01	centimeter* (cm)	centiliter (cl)	centigram (cg)
MILLI	$\frac{1}{1000}$ or .001	millimeter* (mm)	milliliter (ml)	milligram* (mg)

* most frequently used

BASIC CLASSROOM EQUIPMENT CHECKLIST

MATERIALS:

Abacus - Class size/individual. ____

Attribute blocks................ ____

Balance Beam.................... ____

Calculators..................... ____

Calendar - class size........... ____

Clock - large - class size...... ____

Clock - individual size......... ____

Clock - stamp................... ____

Coin stamps..................... ____

Compass......................... ____

Cubic counting blocks........... ____

Cuisenaire rods................. ____

Dominoes........................ ____

Felt cut-outs................... ____

Flannel board................... ____

Flash cards..................... ____

Fractional parts (assorted)..... ____

Geo boards...................... ____

Geometric patterns.............. ____

Hundred charts - class size/ind. ____

Laminating paper................ ____

Magnetic board.................. ____

Magnetic discs.................. ____

Measuring tools-English, Metric
(rulers, scales, compasses,
protractors, beakers, cups,
spoons, thermometers)........ ____

Number lines - class/individual. ____

Numerals - tactile.............. ____

Plastic discs................... ____

Play money...................... ____

Powers of Ten................... ____

Protractor...................... ____

SEE calculators................. ____

Scale........................... ____

Screen (pull-down type)......... ____

Spinners........................ ____

Squared place value material.... ____

Standard playing cards.......... ____

Tangrams........................ ____

Tens frame...................... ____

Timers (1,2,3 minute)........... ____

Tokens (various sizes/colors)... ____

Trundle wheel................... ____

Unifix cubes.................... ____

Unifix 100 board................ ____

SUPPLIES:

Adding machine tapes (for class-
room/ind. number lines)...... ____

Chalk........................... ____

Construction paper.............. ____

Elastic bands................... ____

BASIC CLASSROOM EQUIPMENT CHECKLIST

SUPPLIES: cont'd

Envelopes (all sizes).......... ____

Erasers, board/individual...... ____

Felt pens (all sizes).......... ____

Ditto, Rexograph paper......... ____

Glue........................... ____

Gram weights................... ____

Graph paper (1 cm, <, 1")...... ____

Grease pencils................. ____

Oak tag........................ ____

Paper clips.................... ____

Paste.......................... ____

Plastic discs.................. ____

Pointer........................ ____

Primary pencils................ ____

Rubber bands................... ____

Scissors - primary, left hand.. ____

Scotch tape.................... ____

Spinner........................ ____

String......................... ____

Tape........................... ____

COLLECTIBLES:

Beads and beans................ ____

Bottle caps.................... ____

Buttons........................ ____

Cardboard (all sizes).......... ____

Cereal boxes................... ____

Coffee cans.................... ____

Detergent boxes, shoe boxes,
meat trays, and plastic
containers..................... ____

Egg cartons.................... ____

Felt for desk mats............. ____

Ice cream sticks............... ____

Juice containers............... ____

Macaroni....................... ____

Magazines...................... ____

Menus.......................... ____

Metrically measured cartons.... ____

Milk containers................ ____

Newspapers..................... ____

Paper plates................... ____

Sand........................... ____

Spools......................... ____

String, yarn................... ____

Styrofoam...................... ____

Tongue depressors.............. ____

Wire hangers................... ____

Ziploc Bags.................... ____

270

"END OF DOCUMENT"